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DECEMBER 2005

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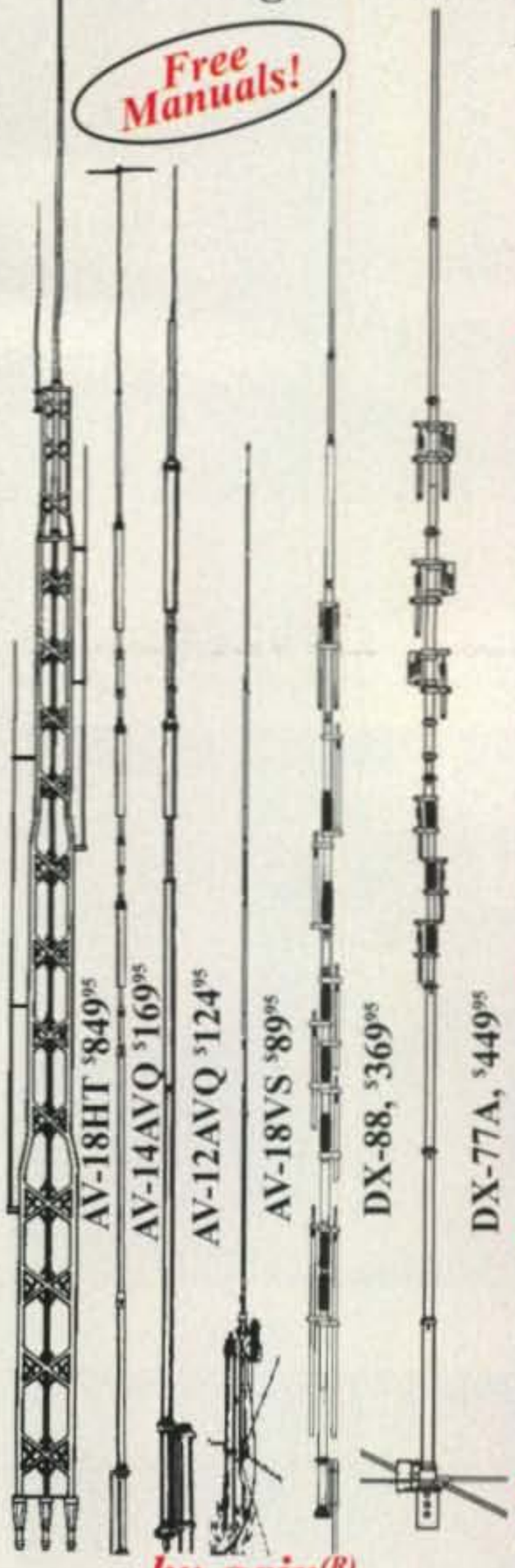

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DX-88, $369.95. (10, 12, 15,17,20,30,40,80 Meters, 160 Meters optional). 25 ft., 18 lbs.

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Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
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AV-14AVQ	**$169.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$134.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$89.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 40 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

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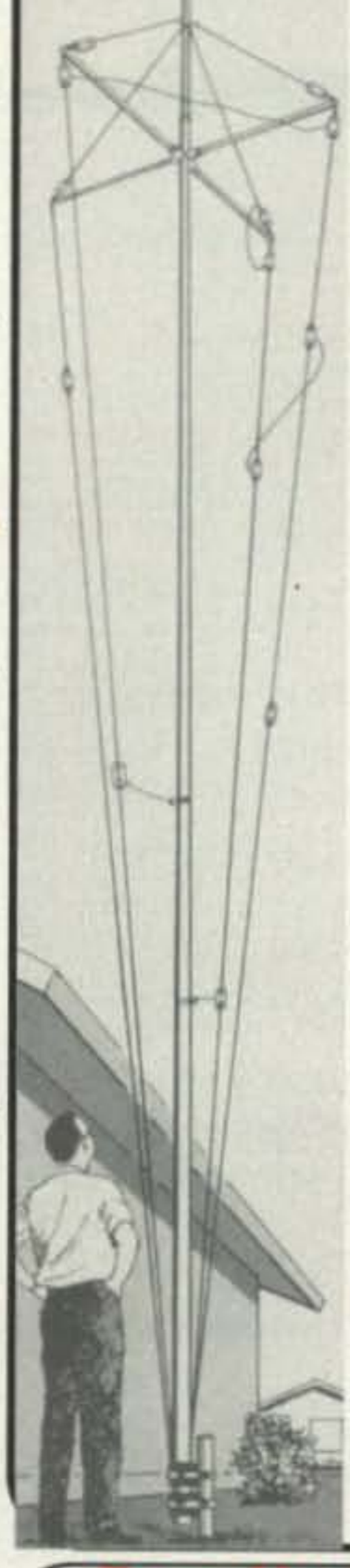

AV-18HT-Jr.
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ON THE COVER: Chet Lambert, W4WDR, regularly plays Santa for various events around his hometown of Birmingham, Alabama. In case you're wondering, yes, the beard is real. Happy Holidays! *(Cover photo by Larry Mulvehill, WB2ZPI)*

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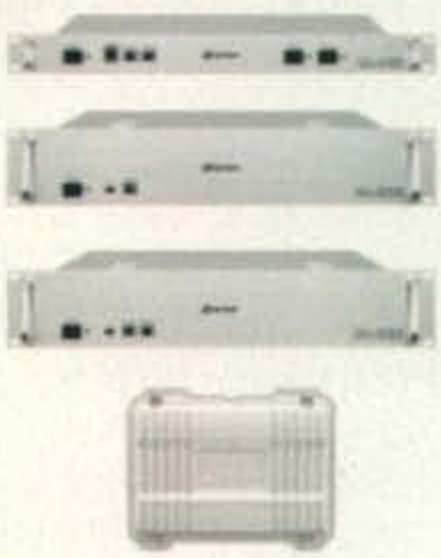

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ham radio news

Hams Prepare for Wilma

As we went to press, Hurricane Wilma was threatening Florida and the entire U.S. east coast. The 21st named storm of the 2005 hurricane season, it was also the most powerful Atlantic basin hurricane ever recorded as it made its way through the northern Caribbean.

On October 20, both the Hurricane Watch Net (HWN)and the ham station at the National Hurricane Center, WX4NHC, announced it would activate that evening to begin receiving reports from hams in affected areas. WX4NHC Assistant Director Julio Ripoll, WD4R, also asked other stations to keep clear of the main net frequency of 14.325 MHz.

"WX4NHC has experienced splatter interference from stations operating too close to 14.325 MHz and using high power and wide deviation during Hurricanes Katrina and Rita," Ripoll said. "We ask that all stations be sensitive to the mission HWN and WX4NHC are doing and to PLEASE move their operating far enough from 14.325 MHz to allow us to copy the weak signals."

KP1/KP5 Bill OKd by House Committee

A bill to re-open two U.S.-owned islands in the Caribbean to limited public access took its first step toward Congressional approval in mid-October. H.R. 1183, which would require the Fish and Wildlife Service to provide limited public access—potentially including amateur radio operations—to Navassa (KP1) and Desecheo (KP5) Islands, was approved without objection by the House Committee on Resources. The next step would be to bring the bill to the floor of the House for a full vote, followed by Senate action. Leaders of the KP1/KP5 Project urge amateurs to again contact their representatives to encourage their support of H.R. 1183 in coming to the House floor for action. For more information, see <www.kp1-5.com>.

PA Utility Drops BPL Trial

A major Pennsylvania utility has ended its trial of Broadband over Power Lines, or BPL, for residential customers and decided against a full-scale deployment. PPL Corporation pulled the plug October 31 on residential BPL in Emmaus and several other communities in Pennsylvania's Lehigh Valley. Emmaus was one location for which the ARRL's Ed Hare, W1RFI, documented high levels of BPL interference on amateur bands. The company's announcement said nothing about interference, however, citing economic reasons only.

ARRL to FCC: Shut Down Manassas BPL

The ARRL has asked the FCC to order the shutdown of an operating BPL system in Manassas, Virginia. In a filing with the FCC's Office of Engineering and Technology and its Enforcement Bureau, the League said the system in the Washington, DC suburbs has been a consistent source of interference to amateurs and that the company that runs it has made no serious effort to resolve the problems. According to the ARRL, field tests were conducted by local hams and by the U.S. Navy, which termed the system "an interference generator" whose signals could be heard "hundreds of feet from the modems on overhead power lines." The League's filing said that, in accordance with the FCC's ruling on BPL last October, "the system must be shut down, pending successful resolution of the severe interference."

In a separate letter to the Office of Engineering and Technology, the ARRL complained that the online BPL database set up under provisions of the FCC's ruling last year improperly limits access to information posted there. According to the *ARRL Letter,* users must enter their Zip code and if no BPL system is found in that locality, they are not permitted into the database.

FCC Considers Revocation of Felon's Ham License

A Louisiana man convicted of burglary and later of federal firearms violations now faces the possible loss of his ham license, even though there is no suggestion that amateur radio was in any way involved in his illegal activities. The FCC said the multiple felony convictions of David Cox, W5OER, of Pride, Louisiana, "raise serious questions as to whether he possesses the requisite character qualifications to be and to remain a Commission licensee and whether his ... license should be revoked." A hearing on the action was scheduled for November 15 in Washington, DC. It is unlikely Cox would be able to be there in person, as he is still in prison on the firearms conviction.

KØDQ in Top Anti-Terror Post

Scott Redd, KØDQ has been sworn in as the first director of the new National Counterterrorism Center. The *ARRL Letter* reports that the well-known contester and DXer was tapped for the post last June by President Bush, began work on August 1 and was officially sworn in by Vice President Cheney on September 12. According to the White House, the National Counterterrorism Center is responsible for analyzing and integrating intelligence pertaining to terrorism acquired from all U.S. Government departments and agencies, and for identifying, coordinating and prioritizing the counterterrorism needs of America's various intelligence agencies.

Contest Station D4B QRT

If you've been at all active in any major DX contest over the past several years, you've probably worked D4B in Cape Verde at least once (and probably many more times). Now, station owner Al Teimurazov, 4L5A, has decided to close the station, which racked up wins and world records in a variety of contests, and possibly to retire from contesting altogether.

Acknowledging that his announcement, posted on his website, "leaves more questions than answers," Al said, "I have achieved and in some cases exceeded all my goals that I set out to do from D4 ... I will stay in contact with all my friends and I will follow contesting very closely even if I am not taking part from D4 or anywhere else myself." He gave no additional reasons for his decision.

Clarification

In our October news report on the annual meeting of the National Conference of Volunteer Examiner Coordinators, we reported that the group had decided not to file comments on the FCC's Notice of Proposed Rule Making on eliminating Morse Code from amateur license exams. Actually, the Conference made no decision at that time (July) on whether to file comments and has now formed a group to do so. In addition, there was apparently no connection between the FCC's NPRM and the conference's decision to disband its Rules Committee, which had previously written its FCC filings. Finally, ARRL-VEC Assistant Manager Perry Green, WY1O, did comment on disappointment among attendees that the FCC had not proposed a new entry level license, but made no comment regarding the FCC's decision not to include in the NPRM the NCVEC's proposal to automatically upgrade Technicians to General and Advanced Class hams to Extra. We regret the misunderstanding.

Additional and updated news is available on the Ham Radio News page of the CQ *website at <http://www.cq-amateur-radio.com>. For breaking news stories, plus info on additional items of interest, sign up for* CQ*'s free online newsletter service. Just click on "CQ Newsletter" on the home page of our website.*

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Maldol NEW AX-75 • Dual-band 2M/70cm w/fold-over
• Gain & Wave: 2M 1/2 wave center load 3.2dBi • 70cm 5/8 wave x 2 5.7dBi • Length: 30" • Conn: PL-259 • Max Power: 60W

Maldol NEW AX-95 • Dual-band 2M/70cm w/fold-over
• Gain & Wave: 2M 1/2 wave center load 3.3dBi • 70cm 5/8 wave x 2 5.8dBi • Length: 38" • Conn: PL-259 • Max Power: 50W

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COMET SBB-2/SBB-2NMO • Dual-band 146/446MHz
• Gain & Wave: 146MHz 2.15dBi 1/4 wave, 446MHz 3.8dBi 5/8 wave center load • VSWR: 1.5:1 or less • Length: 18" • Conn: PL-259 or NMO Style • Max Pwr: 60W

Maldol NEW EX-107B/EX-107BNMO • Dual-band 146/446MHz
• Gain & Wave: 146MHz 2.6dBi 1/2 wave, 446MHz 4.9dBi 5/8 wave x 2 • VSWR: 1.5:1 or less • Length: 29" • Conn: PL-259 or NMO Style • Max Pwr: 100W

COMET SBB-5/SBB-5NMO • Dual-band 146/446MHz w/fold-over
• Gain & Wave: 146MHz 2.5dBi1/2 wave • 446MHz 5.5dBi 5/8 wave x 2 • Length: 39" • Conn: SBB-5 PL-259/SBB-5NMO NMO • Max Pwr: 120W

COMET SBB-7/SBB-7NMO • Dual-band 146/446MHz w/fold-over
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COMET NEW C757/C757NMO Challenger Series • Dual-band 146/446MHz w/fold-over
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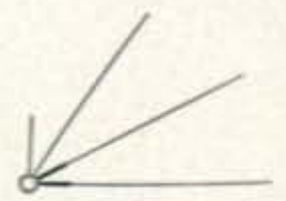

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a CQ editorial

zero bias

BY RICH MOSESON,* W2VU

Looking Back . . . and Seeing Yourself in the Mirror

My mind's photo library still retains the snapshot of the scene for my first contact, although the image is a little blurry around the edges ... sitting in the bedroom shack of my friend, Steve, WA2FIQ (now KC8EJ), with him and possibly one or two other hams from my high school radio club looking on. The transmitter was a Hallicrafters HT-40 and the receiver an SX-140. I remember my hand shaking so much on the key that I'm amazed that WA3JYO, my first contact, could copy anything I sent ... and I couldn't even hold the pencil to write down what he was sending. Fortunately, my cheering section in the background was copying with/for me, and somebody managed to jot down the essentials.

Why has my mind moved this image up front? Well, it was almost exactly 35 years ago that the QSO took place, on November 9, 1970, but that wasn't the trigger. The trigger was an e-mail I received out of the blue a few days ago, from none other than WA3JYO. Jim Emerich is still active and still holds the same callsign he had 35 years ago. It seems I had mentioned my contact with Jim in an editorial back in March of 2003, and he ran into it while "Googling" his callsign. "I happened to search the internet using Google to see if my ham license was listed ... Lo and behold, I came to your article ... So I thought I would drop you a line and let you know that it was an honor to have been your first contact..."

Perhaps it was pre-ordained. Looking back at Jim's QSL card, I saw that he wrote, *"Very glad to be 1st QSO, Rich. Your code speed is excellent for just getting started. I don't know what made me get on that freq and do code for a while, cuz I haven't been on code for 2 years."* I guess some things are just meant to be ... Jim is now living in Texas, where he used to work with *CQ* Antennas Editor Kent Britain, WA5VJB! Small world, this corner of the universe called ham radio.

In any event, Jim's e-mail made me realize it's been 35 years since I first got on the air, and to think about how things in ham radio have and haven't changed in that time. That process was helped along by an e-mail from 1993 that our publisher, K2MGA, stumbled across and forwarded to me. Back in 1991 and 1992, Peter O'Dell, WB2D, who was then our Special Projects Director, had conducted a mail and telephone survey of two groups of newly licensed hams. This, by the way, was just after the code requirement for the Technician license had been dropped, so it's quite relevant today as we discuss the FCC's proposal to eliminate the code test for all license classes.

Peter reported that the survey respondents had fallen into two basic groups, those who had become licensed within two years of getting interested in ham radio and those who had been interested for 20 years or longer, but felt that the code test was too much of an obstacle. Average age was 49, and 90% were men. It took them several weeks to a few months to study for their license exams and most of them found the tests to be about as difficult as they'd expected. Most had purchased at least one piece of new equipment since getting licensed and everyone felt that ham radio had lived up to their expectations.

What were their main operating interests? Peter asked what activities they might engage in over the next year, or the next five years, if money were not an object. "(B)ig amplifiers, big towers and super HF stations received more votes than packet *(which was the hot new mode at the time)* and satellites ... As one fellow put it, 'packet seems interesting, but still there is nothing like being able to talk around the world.' "

Peter concluded, "The people entering the hobby seem little different from the new hams of several years ago. They dream the same dreams of using big towers, big amplifiers and huge antennas to talk around the world. - We have met the new ham, and he is us."

Now we haven't done another survey recently, but I'd be very surprised if we were to do one and the results came out significantly different. As we've said in this space before, DXing is the crown jewel of amateur radio and what sets us apart from virtually every other form of electronic communication. And that's why we continue to believe - as we said here in October - that it would be a big mistake for the FCC to make the General Class license the entry-level license for HF operating.

Happy holidays from the *CQ* "family" to you and yours.

73, W2VU

*e-mail: <w2vu@cq-amateur-radio.com>

CQWW Certificates Up-to-Date

The CQ World-Wide DX Contest is the world's most popular ham radio contest. One of the few long-term problems we have had with the event is getting certificates out to winners in a timely manner. We are pleased to announce that members of the CQWW Contest Committee have finally been able to develop new procedures that have allowed us to catch up on all outstanding certificates, and to hopefully keep everything up to date in the future. In an e-mail to the contesting reflectors, CQWW Director Bob Cox, K3EST, explained the progress:

All winners since 2002 have been printed. Over 6800 certificates have been distributed. This brings the CQ WW contest completely up to date. This fantastic step forward could not have taken place without the enthusiastic help, expertise, and hard work of Barry, W5GN. Working with K3EST, N6TW, K3WW, N6AA, K3LR, K2RED, and K1AR over the last few months, a method was developed to customize each certificate from the results as they appear in the magazine. Barry was the glue that held it all together. The CQWWCC wants to thank him in this public forum. Without his skill, the work would have been overwhelming.

All certificate winners anywhere in the world should have received their award within one month. The great majority of winners will receive theirs within two weeks. If you do not receive your award within the one month time period please contact <questions@cqww.com>. There were several hundred certificates without an address within their Cabrillo file.

The process is now in place to print and distribute the 2005 certificates as you receive the results in *CQ* magazine ... Once again, thank you Barry, W5GN.

We here in Hicksville would like to echo those thanks to Barry, as well as all the other members of the CQWW Contest Committee, who volunteer their time to make this the world's greatest ham radio contest, and of course, all of you who participate and in many cases waited patiently while we worked out a new and better system for printing and mailing certificates to winners.—W2VU

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HAM IV and HAM V Rotator Specifications	
WindLoad capacity (inside tower)	15 square feet
Wind Load (w/mast adapter)	**7.5 square feet**
Turning Power (in lbs.)	800
Brake Power (in lbs.)	**5000**
Brake Construction	Electric Wedge
Bearing Assembly	**dual race/96 ball bearings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	26
Effective Moment (in tower)	**2800 ft/lbs.**

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T-2X
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T-2XD
$1029.95
with DCU-1

TAILTWISTER Rotator Specifications	
Wind load capacity (inside tower)	20 square feet
Wind Load (w/ mast adapter)	**10 square feet**
Turning Power (in lbs.)	1000
Brake Power (in lbs.)	**9000**
Brake Construction	Electric Wedge
Bearing Assembly	**Triple race/138 ball brngs**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	31
Effective Moment (in tower)	**3400 ft/lbs.**

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CD-45II Rotator Specifications	
Wind load capacity (inside tower)	8.5 square feet
Wind Load (w/ mast adapter)	**5.0 square feet**
Turning Power (in lbs.)	600
Brake Power (in lbs.)	**800**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/48 ball brings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	22
Effective Moment (in tower)	**1200 ft/lbs.**

HAM-V

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with DCU-1

For medium antenna arrays up to 15 square feet wind load area. Similar to the HAM IV, but includes *DCU-1 Pathfinder* digital control unit with gas plasma display. Provides automatic operation of brake and rotor, compatible with many logging/contest programs, 6 presets for beam headings, 1 degree accuracy, auto 8-second brake delay, 360 degree choice for center location, *more!*

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For compact antenna arrays and large FM/TV up to 3.0 square feet wind load area. Dual 12 ball bearing race. Automatic position sensor never needs resetting. Fully automatic control -- just dial and touch for any desired location. Solid state, low voltage control, safe and silent operation. 2 1/16 inch maximum mast size. MSLD light duty lower mast support included.

AR-40 Rotator Specifications	
Wind load capacity (inside tower)	3.0 square feet
Wind Load (w/ mast adapter)	**1.5 square feet**
Turning Power (in lbs.)	350
Brake Power (in lbs.)	**450**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/12 ball bearings**
Mounting Hardware	Clamp plate/steel bolts
Control Cable Conductors	**5**
Shipping Weight (lbs.)	14
Effective Moment (in tower)	**300 ft/lbs.**

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HDR-300A
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For ***king-sized*** antenna arrays up to 25 sq.ft. wind load area. Control cable connector, *new* hardened stainless steel output shaft, *new* North or South centered calibration, *new* ferrite beads on potentiometer wires reduce RF susceptibility, *new* longer output shaft keyway adds reliability. Heavy-duty self-centering steel clamp and hardware. Display accurate to 1°. Machined steel output.

HDR-300A Rotator Specifications	
Wind load capacity (inside tower)	25 square feet
Wind Load (w/ mast adapter)	**not applicable**
Turning Power (in lbs.)	5000
Brake Power (in lbs.)	**7500**
Brake Construction	solenoid operated locking
Bearing Assembly	**bronze sleeve w/rollers**
Mounting Hardware	stainless steel bolts
Control Cable Conductors	**7**
Shipping Weight (lbs.)	61
Effective Moment (in tower)	**5000 ft/lbs.**

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announcements

KH6WO Beacon Upgraded – In early October the KH6WO beacon located at BYU Laie, Oahu, Hawaii was upgraded, adding WARC frequencies 18.110 and 24.930 MHz to its transmitting beacon. KH6WO trustee John Peters, K1ER/KH6, KH6BZF, and K7IHI assisted in reprogramming the Northern California DX Foundation controller driving a TS-50 transmitter, adding these WARC frequrncies to the exiisting beacon frequencies of 14.110, 21.150, and 28.200 MHz in FCC compliance. The Honolulu ARC is the owner of KH6WO and maintains this beacon.

W1GMW Special Event – The Green Mountain Wireless Society will hold a special event on December 10 from 1200– 2400Z from Rutland, Vermont, to commemorate the 25th anniversary of the club's founding. Frequencies: 14.240, 7.240, 7.050, and 3.840 MHz. For QSL send SASE to Green Mountain Wireless Society, P.O. Box 84, Rutland, VT 05701 (www. gmws.net).

W2W Pearl Harbor Day Special Event – The Historical Electronics Museum ARC will commemorate the invasion of Pearl Harbor with a special event station on December 4 & 5 from 1400–2200Z near 7.241, 14.241, 21.241, and 3.592 MHz. Certificate for QSL and two stamps. Send to HEMARC, P.O. Box 1693, MS 4015, Baltimore, MD 21203.

W4NC Special Event – The Forsyth ARC will operate from Winston-Salem, North Carolina, from 1200–220Z on December 17 in celebration of the 75th birthday of the club. Using vintage stations on AM and CW, they will be on SSB 21.320, 14.270, 7.250; CW 21.050, 14.050, 7.050; AM 7.285–95; all ±20 kHz. For original 1930 W4NC QSL card and/or certificate send QSL and SASE to Ed Swiderski, KU4BP, 2105D Fiddlers Court, Winston-Salem, NC 27107, or via the bureau.

KC5OUR Special Event Station – The Valencia County ARA will celebrate Christmas from Bethlehem, New Mexico from 1400Z December 17 through 2300Z December 25 on 7.273, 14.273, 21.373, and 28.373 MHz. For QSL send QSL and SASE to VCARA, P.O. Box 268, Peralta, NM 87042.

The following hamfests, etc., are slated for late Nov. and Dec.:

Nov. 25, **Fair Lawn ARC Amateur & Electronic Equipment Auction,** 7 PM, Fair Lawn Senior Center, Fair Lawn, New Jersey. Contact FLARC, 201-791-3841, or e-mail: <w2npt@arrl.net>. (Talk-in 146.79–; PL 141.3)

Dec. 3, **Superstition Hamfest 05,** Mesa Community College, Mesa, Arizona. For more information, go to <http://hamfest.wb7tjd.org>. (Talk-in 147.12; exams 8 AM)

our readers say

Antenna Matters

The following letter is to CQ Antennas Editor Kent Britain, WA5VJB:

Dear Kent,

I've built a few "Cheap Yagi" antennas and had good results using them, but I wonder if I can do better. I cut the elements to measure, except I make the driven element a bit long, then trim it until the minimum-SWR point coincides with the frequency I want to work. In a recent example, I was working with a 4-element Yagi for 147 MHz (lengths and spacing scaled from the 144-MHz table) made of #10 aluminum grounding wire (passive elements) and #12 copper house wiring for the driven element, with RG58 coax soldered to the feedpoint.

I was measuring with an MFJ-259B at the end of about 6 feet of coax, and the best SWR I could achieve was about 2:1. The MFJ-259B reports resistance and reactance, and as far as I can recall, the problem appeared to be that the resistance was fairly low. But, since this was at the end of a coax of unknown length it's hard to know how to interpret that.

Is there a cookbook recipe for tweaking these antennas to get 50-ohm impedance at resonance? Assuming my coax is an electrical halfwave, what effects on feedpoint impedance should I measure from actions such as ...

- trimming the free end of the driven element
- expanding or compressing the spacing of the folded part of the driven element
- bending the reflector toward or away from the driven element
- bending the first director toward or away from the driven element
- trimming the end of a passive element

... and what would be the corresponding effects on the pattern (F/B, gain)? And do any of these tweaks affect how these proper-

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ties hold up over a wide bandwidth?

I appreciated your article a couple of months ago on how performance is affected if half an element disappears. I wonder how performance would be affected if an element gets slid sideways by a few inches, or even as much as one quarter of its length.

Thanks for the designs and the informative articles!

Bill Noyce, AB1AV

WA5VJB replies:

Hi Bill,

My, you've been busy.

The low impedance is a symptom of overcoupling to the first director. If the first director is slightly long, or there is a lot of wood/metal in the center, the Yagi will overcouple like that. Bending Dir. 1 forward is a good quick check, but you have traded gain/pattern for SWR. Long term is to trim Dir. 1 a bit.

Length of the coax will not change SWR, when you don't have any SWR to begin with. So that shouldn't have an effect. Width of the J is not a critical dimension. It will make a minor change in SWR, but very little.

I've played with sliding the element, certainly something you don't see often with a commercial antenna. Dir. 1 has the most effect, but it has to be about 1/10th the element length before you see much. The other elements can be moved much farther. And if you drill the boom and don't quite have the elements lined up, it looks bad, but doesn't change performance.

73's and have fun!

Kent, WA5VJB

FCC's License Exam Proposal

Editor, *CQ:*

I do not agree with W2VU's statement on page 8 of the October 2005 issue. He says, "Passing a code test does not make ... (you) any more likely than anyone else to actually operate CW."

In 1949, I was a few years too young to get a CB license, so with a high school friend, I practiced CW until we both could get ham licenses. It was in 1952 (we bootlegged for a few years) when we were first licensed. Had I not passed a code test, I would not have bothered to use CW or worked to get a professional CW ticket. Heck, I'd now be happy as Larry, yelling 10-4 or 10-8 or something else as useless on channels 1 through 40.

A very good reason for keeping CW in amateur radio appears on page 25 of the October 2005 issue of *QST*. It's a letter by W3RJW, who lives in Churchville, PA.

R.F. Fisher
Tremont, Mississippi

Reader Input Wanted

Editor, *CQ:*

My sister is going to the Sudan in Africa to do some missionary work. No electricity, but she found some solar panels that may work. I know nothing about satellite phones and I have heard that satellite service may not be too good there. I grew up in a ham house. W4GHX was my dad (Thomas L. Baker), who passed away 30 years ago, and Mom was K4LDA (Jini Baker). I still remember them talking on the 80 meter band and working something called MARS back in the late '50s and early '60s.

I know technology has improved dramatically in the past 30 years. There must be an answer for my sister. The problem is finding out her best option for communicating back here to the States. Maybe with e-mail/laptop? She mentioned IPAC, but those things are battery hogs. She needs something reliable, inexpensive, and rechargeable with a solar panel. She doesn't have a ham license and I'm not sure of the rules in Africa regarding radio communications.

Is there anyone out there who could make some recommendations? There must be some of your readership who have worldwide experience. She is doing good work, and it would be cool if someone would be willing to assist her in her endeavor. Thanks.

Tim Baker
Winston-Salem, NC
e-mail: <divingdad@triad.rr.com>

W2VU replies:

Tim, I'm sure there are readers out there with the information you are looking for. I've included your e-mail address so that anyone who can help may contact you directly.

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It's a natural combination—a ham radio club within a public-service club for RVers, folks who travel the country in recreational vehicles. This month, "Sam's Radio Hams" celebrates its 25th anniversary as a chapter of the nationwide "Good Sam Club."

Sam's Radio Hams Celebrate 25 Years on the Air

BY GORDON WEST,* WB6NOA

The word on 40 meters and 75 meters is loud and clear: Sam's Radio Hams are one bunch of happy campers, regularly planning upcoming outings and always supporting several public-service and charity events. As of this month, they've been doing it for a quarter century and are still going strong.

Monthly newsletter editor Ron Malanosky, W6KPM, shares a brief history of the success of this amateur radio and recreational vehicle organization.

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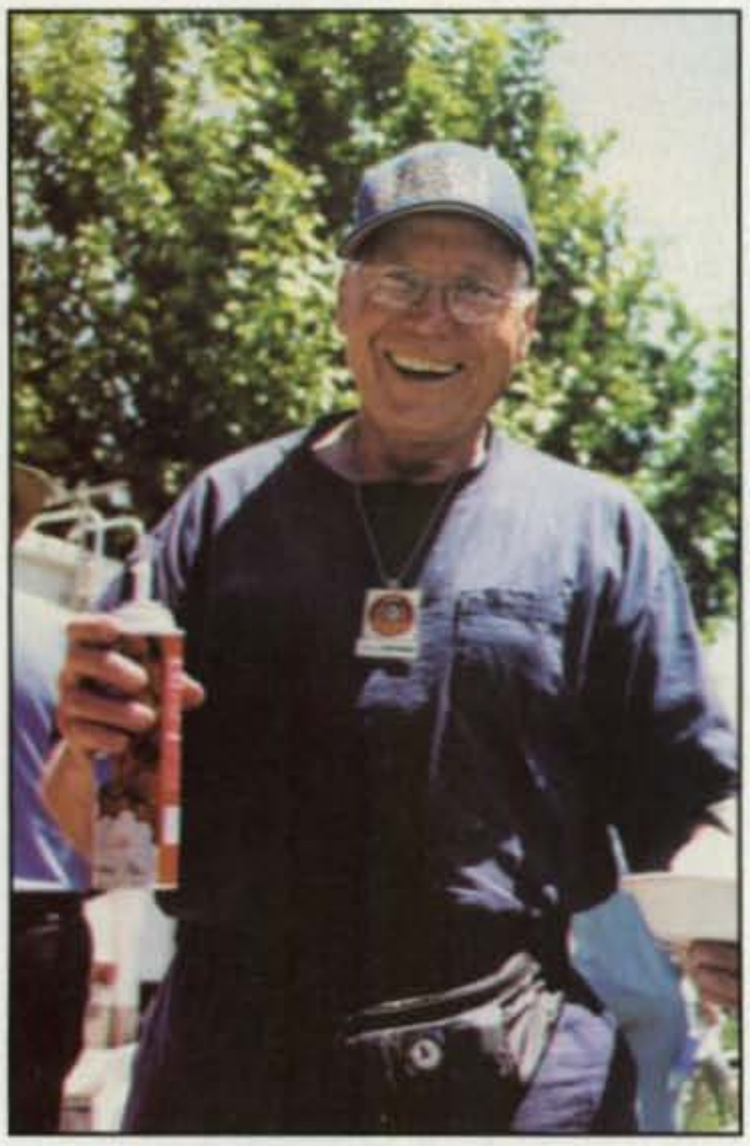

Here Sam's Radio Ham Harry Hinz, KE6RJ, is as happy as a ham can be, holding a dish of ice cream and a can of whipped cream!

Sam's Radio Hams, a chapter of the nationwide Good Sam Club of recreational vehicle (RV) enthusiasts, draws big crowds every month to its campouts and other events and activities. The club is celebrating its 25th anniversary this month.

It was 25 years ago when the Sam's Radio Hams were granted a charter as an affiliated chapter of the Good Sam Club *(see "The Good Sam Club" sidebar if you're not familiar with this organization.—ed.)*. We had a lot of name suggestions—Rolling Hams, Outdoor Rigs, Outdoor Hams, with Sam's Radio Hams earning the highest vote.

In the early '80s, the club started a net on 7263 kHz at 10:00 AM on Sundays, filling in for the RV service net that did not meet on Sundays. The net was an instant success, and every month Sam's Radio Hams all would go on a campout and enjoy the RV lifestyle of fresh air and ham radio in the wilds.

Sam's Radio Hams Net Schedule and Public Service Events

7268.5 kHz: 9:00 AM Pacific Time, Sunday mornings
3918.5 kHz: 8:00 PM Pacific Time, Monday–Friday evenings
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Food is a big part of any successful ham gathering, and this Sam's Radio Hams campout in Pahrump, Nevada, featured a Dutch-oven cooking demo. . . . Good fellowship and good food—a winning combination!

In the late '80s Ruth Beane, N6ZCE, and Lucille, N7LTL, worked up the distinctive ham radio vests that make the club members easy to spot at any major campout.

In the early 90s, they began to offer VE testing, so there were plenty of opportunities for campground training, testing, and working new campers onto the airwaves beginning with RV mobile.

The 1990s also saw the beginning of the Sam's Radio Hams newsletter, "Ham O Gram," simply abbreviated "HOG." Every issue is a "must read" for all of the extraordinary fun and public service the Sam's Radio Hams would do each month. Reading over the past newsletters, you can really say it was a close family affair: "The June trip to the Gold Rush country was a new experiment for the hams," reads a late '90s newsletter. "We traveled and camped for a week and stopped at multiple destinations. We would operate, on the air, every night!"

"And once again, we provided communications for the Whitney Classic Charity Bike Ride from Death Valley to Mount Whitney; the 160-meter band would be our principal communications link," read another newsletter, further attesting to some of the big coils you see on many of the rigs run by these fun-loving RV hams.

Best of all, a gathering of the Sam's Radio Hams brings together experts who not only share technical experience in ham radio, but also practical experience in RV vehicles, engines, tires, transmissions, and just about any other RV component you might "toast" while heading up a steep grade out of Death Valley, Nevada. That's where I enjoyed one pleasant Sam's Radio Hams weekend campout, in Pahrump, Nevada. This particular campout featured ham operator demonstrations of Dutch-oven cooking (see photos).

Sam's Radio Hams are not necessarily just a 5-land and 6-land group, either. Many of the members take their RVs throughout the United States and continuously stay in touch with other chapter members on 20 meters and up. These traveling ham ambassadors tell of the success story of this chapter through the efforts of monthly newsletter contributors and individual charity efforts of its members, and at least once a month a mini or major campout is organized just to bring everyone together in friendship and love of ham radio.

CQ readers who are also RVers and who may be thinking of starting their own chapter are encouraged to contact Sam's Radio Hams and see all they do to make their chapter a 25-year success story. For more information, see the group's website at <http://www.srhams.org/>, or e-mail Ron, W6KPM, at <rmalanosky@aol.com>. ■

Quartzfest 2006

RVing hams are invited to attend Quartzfest 2006 at the annual Quartzsite, Arizona RV gathering, between January 22 and 28. Quartzfest, featured in last January's *CQ*, is based at mile 99 on Route 95, just south of the Quartzsite RV show, according to Tom Hensley, KD7AHL. Each day of the week-long event features ham/RV-related seminars as well as special events. The Quartzsite repeater is on 145.500 MHz (–600 offset), and 146.550 MHz is the local "intercom" frequency as well as the home of the Quartzfest morning net. For more information, visit the Quartzfest website at <http://www.quartzfest.org>.

The Good Sam Club

The following information comes from the Good Sam Club website at <http://www.goodsamclub.com>:

The Good Sam Club got its start 38 years ago when a handful of RV owners put Good Samaritan bumper stickers on their rigs so fellow members would know they could get help on the road. From this small club we grew. In the early days, Good Sam members spread the word at RV parks and other club events. Soon everyone wanted to know how to get a Good Sam "smiling face" decal.

Today our primary goal remains the same as in those days: to make RVing safer and more enjoyable, and to save our members money through club-endorsed benefits and services. We are now 1-million RVing families strong and still growing! We still have fun, we stop to help one another, and we still meet our responsibilities to the environment, the highways, and the park systems.

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Results of the 2005 CQ WW DX 160 Meter Contests

BY DAVID L. THOMPSON,* K4JRB

Another record number of logs were received, breaking the 2004 record by a substantial margin. Including check logs, there were 1497 CW Logs and 802 SSB logs, for a grand total of 2299 logs. The CQ WW 160 Meter Contests continue to be far and away the most popular contests on Top Band.

The lead story of the results this year is the records set by Al, D4B, on both modes. Al announced in September that he has closed the D4B contest station. In his final 160 effort on CW, Al broke the old record (set in 2004) *by nearly 1 million points.* In addition, he worked 91 DXCC counters and broke the old QSO record set on SSB by WB9Z by over 200 QSOs, recording 1995 Top Band CW QSOs. On SSB, Al set the new single operator record score and tied the DXCC count of 81. Imagine working 81 SSB counters on 160 in a short weekend! Congratulations, Al, and good luck with your new endeavors.

Noteworthy were the efforts by two Top Band veterans, Paul, N4PN, and Jeff, VY2ZM (K1ZM). Paul and Jeff piloted VY2ZM to the world high CW mult-operator plaque while placing second to D4B in overall score. Paul then operated the W8JI super station using his own call, easily winning the USA SSB plaque. Jeff went single operator on SSB at VY2ZM, winning the Canada plaque while again placing second to Al, D4B, for overall score. Al, Paul, and Jeff demonstrate that contesting on Top Band can be fun and rewarding.

The master log shows 163 DXCC entities (that is what they are called these days) on CW and 148 on SSB. Removing unverified contacts, there were 5213 different stations on CW and 5089 on SSB. It's hard to compare numbers with all the computerized log checking software (versus the old hand counts), but any stations with medium power and at least 100 watts to an inverted-L can easily work their fill of states, provinces, and DXCC counters. The top scorers work all the states and at least 50 DXCC entities each year. If you are reading this and have never been on Top Band, why not get on and join the fun?

Please obey your rules and regulations. Most countries limit the 160-meter band on CW and usually even more on SSB. There are limits on power, too. I get complaints each year of stations operating far beyond the legal limit and transmitting far outside the allotted band. Please help us expand the operating allocations on 160 by asking your country's IARU representative to ask for a worldwide band from at least 1800 to 1900 kHz. This is one surefire way to get the IARU and ARRL type band plans to work. With the replacement of LORAN, there is no reason why there should not be a larger worldwide allocation. Ask yourself, if a United States operator can operate up to 2000 kHz, why can't the band be expanded elsewhere? In 2005 there was CW operation up to 1880 kHz and SSB operators up to 1950 kHz and beyond. Please help in leveling the playing field for all the competitors!

A few administrative notes before diving into the competition review. There are only two types of classifications, Single Operator and Multi-Operator. If you get help or use a spotting network, you are multi-operator. All multi-operators are considered high power, so run as much power as you can (not to exceed your legal limit). Single operators are classified by power level. That includes high, low, and QRP.

*4166 Mill Stone Court, Norcross, GA 30092
e-mail: <thompson@mindspring.com>

Mek, SP7VC, a rare SSB entry from Namibia. Mek says to please listen for Africa.

Paul, N4PN, operating at CW multi-op station VY2ZM. Paul also had the high US SSB score at W8JI as N4PN.

Certificates are given to the high scorers in each state, province, or country for each classification. See "Certificates and Plaques" in this write-up for more information on certificate requirements.

Maritime mobile stations count 5 points with no extra multiplier. A maritime mobile station should be in international waters and give its region as the location (R1, R2, R3).

CW

Al, D4B, broke OH2PM's nearly new 2004 record at EA8BH by a whopping 1-million points. Al also set QSO and DXCC multi-

plier records for single operators. His 2005 record should stand for a long time. SN7Q and OK1RF burned up Europe with million-plus scores, too. To make the single operator top 10 the lowest score was 750K, or the average top score over the past dozen years. KT1V surprised everyone by taking USA honors, with AA1K (rare Delaware) and W4MYA following in second and third place. Jim, K9DX, did well scoring in fourth place USA while winning the Zone 4 plaque. VE3AT was the top Canadian, with VE3DZ traveling to rare Zone 2 and taking VE2IM to second place. C4M led the world on QRP, with surprising K3BU making the top 5 box with high USA score. OK1CF led the low power crew with VE3OSZ and NØFW leading the Canadian and USA contingent. NØFW was a busy man, as he also had the top USA SSB low power score. CT3M and MD4K followed multi-operator leader VY2ZM to place second and third, respectively, with scores well in excess of 1 million points. John, VE3EJ, made a fine sixth place finish while leading Canada. John, W2GD, led the USA again. He was warming up for the SSB section (see the SSB results). To make the Top 10 box on CW a multi had to score 847K or better. In past years a score of 847K won the plaque.

Pity poor Geoff, WØCG, who lost commercial power at PJ2T and could only operate one night (he scored 937K). UU7J broke the old mark with 93 DXCC entities (closer and closer to DXCC).

Close single operator races occurred in Pennsylvania, Tennessee, Mississippi, Belarus, Croatia, Slovakia, and Slovenia. There were tight races for low power and QRP farther down the listings. One of the closest races in the multi-operator ranks was between KØRF and KØDU in Colorado. KØRF won by virtue of getting to more DXCC counters even with 60 less QSOs. The competition on Madeira Island between CT9M and CT9C must have left the island tingling with RF. Both made the Top 10 box comfortably. Close races occurred in Japan, Croatia, Germany, Finland, Italy, Serbia, and Slovakia. Placing second in these races is not a defeat! Breaking 1000 QSOs and 50 DXCC counters used to be rare but has become commonplace.

SSB

Al, D4B, easily defeated LY4A and last year's top single operator, CN2R. His 1.46M score and 81 DXCC counters set new contest single operator records with only multi-operator UU7J's 83 beating his DXCC count. John, W2GD, went south to Aruba and put P40W in fourth place. The rest of the top 10 DX were dominated by Europe (as always) except for Herb, KV4FZ, who placed seventh and won the K2EEK CQ North America plaque.

Paul, N4PN, easily topped USA entries, with regulars WB9Z (Zone 4 plaque winner) and W4MYA (Zone 5 plaque winner) following and W3BGN sliding into fourth. Steve, W3BGN, complains that his wife's birthday is on the contest weekend so he can never enter for the full time. Jeff piloted VY2ZM to the Canada plaque and second high score overall on SSB. KP4KE took advantage of his DX location to nip Brian, VE3MGY, for world high QRP. W4TMR led the USA QRP contingent with a score better than his CW entry!

S57M easily made the world high low power score. NØFW led the USA while placing third world high, and VE9KAR led Canada. Bud, K4ISV, repeated as SSB world high multi-operator. The veteran Ukraine crew at UU7J placed second (with a high 83 countries logged). The XE1KK- and XE1VIC-led Mexican crew at Radio Club Satellite placed third from XE1RCS. Both VP5B and XE1RCS caused quite a stir on European spotting networks, too.

N2CW repeated as top USA multi-operator plus made the Top 10 box at number 8. VE3YAA made the Top 10 multi-operators from Canada, landing at number six. Two Hungarian entries made the Top 10 multi listing, including HA8KCK and tongue-twister HA8ØIARU. Even the CQ 160 robot hiccupped at the HA8ØIARU call (length of call).

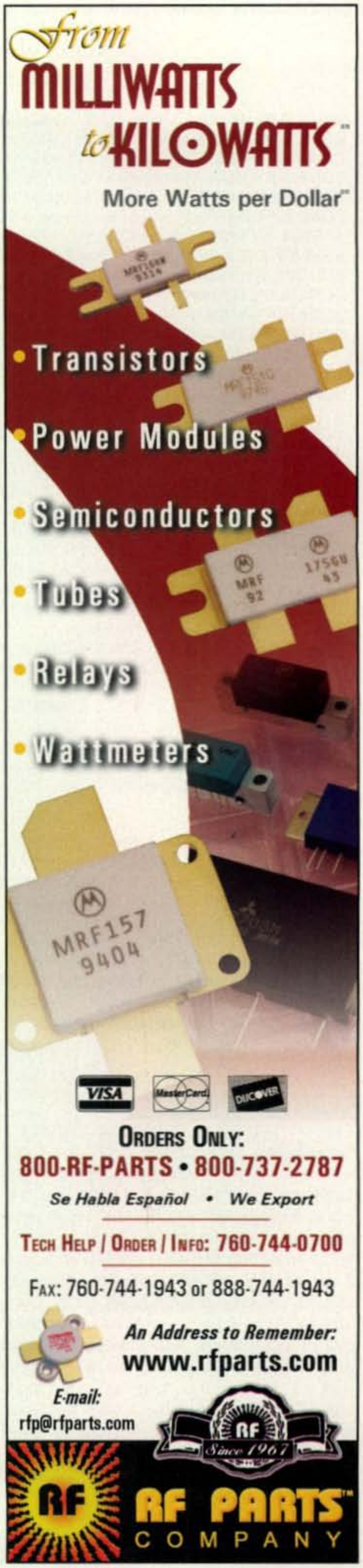
Close single operator SSB races occurred in Maine, New Hampshire, New Jersey (three way), Tennessee, Oregon, West Virginia, Ontario, The Netherlands, and Slovenia. The closest race was between WA7LT and W7DX in Washington. Lamar, WA7LT, won by 72 points, with both scores over 101K. The race was also for the Zone 3 plaque. Michigan was very close (less than 1K, as was Alabama (about 1K). There was a three-way race in Nebraska among WNØL, KBØARZ, and WØHXL.

On SSB, the preferred plan is for the USA to operate above 1843 and listen down for DX. There is no DX window on SSB due to the ARRL/IARU band plan. This is just a gentleman's agreement and it's up to each operator to use his/her privileges as he or she sees fit. Please try to avoid nets already in operation and be civil in instances of name-calling and intentional interference.

Clubs

The Bavarian Contest Club set another club record with just over 12.9-million points. The Yankee Clipper Contest Club placed a strong second with 10.68-million, followed by the Potomac Valley Radio Club, the Frankford Radio Club, and Contest Club Ontario. All three scored well over 7 million. There were an astounding 28 clubs with over 1-million points.

Want to get your club on the list? Your club needs a minimum of three logs to do



2005 PLAQUE WINNERS AND DONORS

SINGLE OPERATOR
CW

WORLD BY W4ZV (DJ8WL MEMORIAL): Winner Alexander Teimurazov, D4B (4L5A)
USA BY K4TEA: Winner Theodore Demopoulos, KT1V
CANADA BY K8FC: Winner Ron Vander Kraats, VE3AT
ZONE 3 BY N5IA: Winner Ken Keeler, N6RO
ZONE 4 BY K4WA: Winner James Battin, K9DX
ZONE 5 BY N4PN: Winner Jon Zaimes, AA1K
AFRICA BY WS9V: Winner Giacomo Patane, IH9GPI
ASIA BY K4SX: Winner Harry Booklan, 5B/K3UY (RA3AUU)
EUROPE BY K9DX: Winner Krzysztof Sobon, SN7Q (SP7GIQ)
RUSSIA BY RZ3AA: Winner John Nalbandyan, RA6AX
OCEANIA BY K9DX: Winner Ken Brown, NH6KB (N6KB)
SOUTH AMERICA BY W4NU (W4UUH Memorial): Winner: Caribbean Contesting Consortium, Geoff Howard, WØCG Operator
JAPAN BY W4ZV(JA1XAF Memorial): Winner Masaki Okano, JH4UYB
NORTH AMERICA by CQ (N4IN Memorial): Winner Ray Sawtelle, VP2E (N5AU)

SSB

WORLD BY N4NX: Winner Alexander Teimurazov, D4B (4L5A)
USA BY K4JRB: Winner Paul Newberry, N4PN
CANADA by WØETC: Winner Jeffrey T. Briggs, VY2ZM (K1ZM)
ZONE 3 BY N4TMW: Winner LaMar Ray, WA7LT
ZONE 4 BY N4XMX: Winner Jerry Rosalius, WB9Z
ZONE 5 BY K1PX: Winner Robert S. Morris, W4MYA
AFRICA BY WB4ZNH: Winner James P. Sullivan, CN2R (W7EJ)
ASIA BY NT4TT/AH2BE: Winner Mamuka Kordzakhia, 4L2M
EUROPE BY WS9V: Winner Rolandas Jokubauskas, LY4A (LY2FY)
OCEANIA BY D4B/4L5A: No Entry
SOUTH AMERICA BY D4B/4L5A: Winner John Crovelli, P40W (W2GD)
NORTH AMERICA by CQ (K2EEK Memorial): Winner Herb Schoenbohm, KV4FZ

MULTI-OPERATOR
CW

WORLD BY N4RJ: Winner Jeffrey T. Briggs, VY2ZM
USA BY W8UVZ, WØCD and K8GG: Winner John Crovelli, W2GD
Zone 3 by 4X4NJ: Winner Jim Wilson, N7JW

SSB

WORLD BY SOUTHEASTERN DX CLUB: Winner Bud Foster, VP5B (K4ISV)
USA BY WB9Z: Winner South Jersey DX Association, N2CW
Zone 3 by 4X4NJ: Winner J. C. Stevens, KG7H

so, and remember DXpeditions count for your club even if it's to a nearby state or country. Every year clubs leverage this to move their club up a notch or two. The club contest is a "for fun" competition to boost participation. Join the club fun in 2006.

Logging Notes

The contest robot at kkn.net expects a Cabrillo log. Hopefully in 2006, the robot will check the QSO line in addition to the summary. Much time is lost each year trying to fix logs that are homebrew or tampered with in some way. Thanks to the yeoman efforts of Eddie, GØAZT/W6, and Bob, W5OV, most problems were resolved. AD1C and K3WW also contributed to the clean-up effort. Your submitted log reflects how professional you are, so please submit a good log and correct all defects the robot points out. A clean Cabrillo entry makes scoring of logs go faster and makes the process more accurate as well.

If you send a computer printout as a hand log, include a diskette (3.5-inch please). The contest committee will ask you to send one later, so save yourself time. If you can't make a Cabrillo log, then just send the old log and summary format and the log will be converted to Cabrillo. Hand logs are still accepted. Please use 40 lines per page, clearly note points and multipliers per page, and include a proper summary sheet. You can obtain a paper log and summary sheet from CQ either in writing or from a visit to its web page, <www.cq-amateur-radio.com>.

For the CQ 160 contests unverified contacts means uniques above a certain percent. The log-checking program notes an exception when 3% uniques are noted, and your log may be disqualified for over 7% uniques. The average (for big logs) is about 1% unique. There is no intention of automatically removing uniques in light of the efforts by many to build stations that attract casual contacts with stations not in the contest. The routine is there to quickly catch rubber logging of unverified contacts. Several years ago one station log contained 51% uniques. This log was disqualified. Honest logs will not be affected. Please leave all duplicate contacts in the log. There is no penalty for duplicates (this was an old hand-logging rule). Removing them might cost you a multiplier or valuable points if the first QSO is busted at the other end.

Certificates and Plaques

The rules for plaques and certificates are changed to meet conditions every so often. Only one plaque per section is awarded per entrant. The runner-up gets a plaque for country or continent. No plaque is awarded for a score of less than 30K. Minimums for low power and QRP certificates are 5K for low power and 1K for QRP. Exceptions are made by CQ 160 Committee decision (Japan Low Power, for instance). The CQ 160 Committee or the Contest Director can decide not to award a certificate if the effort is not shown (usually a very low score). A runner-up in either a state, province, or country can be awarded a second-place certificate if there are eight or more entries and the score is 100K or more. Have patience, please, as volunteers handle all plaques and certificates.

The 2006 Contests

The dates for the 2006 CQ WW 160 Contests are set for CW January 29–30 and SSB February 25–26. The contests run from 0000Z the first date to 2359Z the second date. Logs may be submitted as hand logs and snail-mailed to CQ (CQ 160 Meter Contest, 25 Newbridge Road, Hicksville, NY 11801) or in Cabrillo format via e-mail to the addresses noted below. Send e-mail logs as an attachment and not in the e-mail directly. You may also submit electronic logs on diskette (3.5 inch please). We must hold everyone to our required deadlines of February 28, 2006 for CW and March 31, 2006 for SSB. The exception of sending both CW and SSB together has been eliminated, so please make a note and pass the word! Mail logs must bear a postmark no later than the deadline for consideration.

This year CW logs go to <160cw@kkn.net> and SSB logs go to <160ssb@kkn.net>. Remember to put your call in the subject line of the e-mail. Name the log your call.log (K4JRB.LOG, for example). Mark snail-mail logs as either CW or SSB. Good luck!

73, Dave, K4JRB

W/VE QRM CW

Was tempted to go QRO but stayed with 5 watts. Very happy with the results. Thanks to all those who stuck it out with me...**KFØXV.** 100% vintage radio. Viking 1 transmitter, 811A amplifier, and 75A4 receiver...**K1DT.** Late at night with a cup of coffee in hand I remember my seagoing days on 500 kHz...**K1BTD.** Same problem as last year. Ice storm Saturday morning detuned my antenna to near the broadcast band...**N2FY.** I have been inactive for over a year so it's good to be back on and working friends. I heard some

Europeans but unable to work them due to heavy QRM. Worked BA4DW for number 106 from the mobile setup...**KH6DX/M.** It's amazing to work Japan on 160...**AD7AF.** Had to QRT due to health problems. Age is 86...**W7HS.** Sorry my log is so small. This log is my statement saying simply that "I was there."...**VA3IX.** Great opening to the west. 160 is a great band if folks are on to it...**WA2ALY.** High point was working KH6 with my QRP early Sunday morning...**W4TMR.** Only needed Asia for WAC on 160...**K1BV.** Low QRN this year to match the good band conditions...**W3TS.** Did not feel well this year and what a waste as band conditions were excellent...**WA9TZE.** My first 160 meter contest since 1990 with a decent antenna. I was stuck in a condo from 1991 to 2003...**WD9DCW.**

First contest in my 45 years of being a ham. I'll be back...**AK4RS.** Amazed at the coverage possibilities on 160...**KM5I.** 160 is still the "gentleman's" band...**WØRMA.** It doesn't get any better than this...**NØXM.** Used a J-38 straight key for all contacts...**N2GT.** Thanks to CQ for bringing life to 160...**KA6UMQ.** I did not think I would get out so I waited until the end to operate and boy was I surprised...**K1YHR.** I have worked the contest before but this is my first time to send in a score...**KØSRL.** Good conditions both nights but best to Europe on Saturday. Vertical array played nicely. S7 to 8 line noise buried low signals...**AC7A.** Ran 100 watts to a 30 foot tall T with a 120 foot horizontal top hat. Worked good but little DX. I am working on improving the antenna for 2006...**AE6NY.** Thanks to Jeff, K4JNY, for letting me play with his toys...**KØEJ.** VP2E sent AXA. I have no idea what that means...**K1EP.** Coax went bad on the 10th contact Friday. Family birthday's kept me from repairing until late Saturday and made a few more contacts...**K2GN.** Murphy got me good this year. A snowstorm hit and power went out 13 times. At 11:45 PM it went out entirely and was not restored until the next morning. Next year has to be better...**K8FC.** Several stations had bad key clicks...**K7OX.**

Unusual to have good conditions and weather at the same time...**K4RO.** Lost my inverted L the second night...**K4CNW.** What a grind QRP is! You have to love being stomped...**K3BU.** With only a makeshift L at a max of 35 feet I scrapped plans to operate this contest. However, I finally got on to rub a contest "fix." Was I surprised at how well I did even with a high SWR...**K6VVA.** Improved my score plus worked HK1XX for a new country on 160...**K3SWZ.** Great fun. Worked 24 out of the 30 possible hours...**N1ZZ.** With a long wire only 18 feet above the ground amazed anyone heard me at all...**NO2D.** No real time to operate. Thanks, to all who heard my old Corsair...**NØOCT.** Our best team performance ever...**VE2OJ.** Nice to work 9V1GO...**VY2ZM.** Had to fight for every QSO. Back with better antenna and more power ...**W9SZ.** Hastily put up an antenna to get on from my new QTH...**WA5TWL.**

DX QRM CW

Many will remember me as OK1JDX...**OK1TP.** Tough going for a QRP station...**PAØRBO.** Fun to be back on 160 meters after 16 years QRT ...**JA1CMD/Ø**. It's a challenge to work 160 from a small lot with a small antenna...**JH3SIF.** Conditions were good but a storm took the antenna down...**LA8WG.** Great working Africa and Europe on 160 QRP...**VP2V/W3HQ.** Again entered just for the fun of it. No chance to win Hi...**DLØVLA (op. DL1JFM)**. Nice beach operation at Laupahoehoe Point Beach Park near

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Hilo, Hawaii. The only problem was S9 plus QRN...**KH6GP.** I am also SP9JZT back in Poland...**EI9JN.** Hard work with a dipole made for 80 meters...**OM3CDN.** Had to prepare a hand log due to a computer crash. Worked the contest with 5 watts to Fritzel FD-3 40 meter off-center-fed wire...**DJ3GE.** Heard many more USA stations than I worked...**OH3WD.** Thanks to this contest I now have 46 states worked ...**CT1FJK.** Heard 43 different states and provinces from North America...**HA3O.** Wow. And they keep saying CW is dead. My personal best and I am 75...**GW3JXN.** Nice to be back in this contest...**EA8ZS.** Nice hotel QTH but with heavy city noise...**CT3BH (op.OH2PM).**

Operated from Erk Island, EU 136...**9AØR.** My first try at QRP. Conditions were fine ...**DJ1AA.** Blessed with good conditions and a quiet QTH...**MD4K.** Just one new country due to limited time available. Hope to get DXCC on top band soon...**OE2S.** 35 watts to a small L. Wow, what a contest...**OM3BA.** What a great site for a contest (KV4FZ's QTH). Hardly had to move with the pile-up of North America and Europe. Sure will be back as KP2ZZ next year...**KP2ZZ.** When the power went down I turned on the generator. However, it did not provide stable and reliable AC so I was forced to quit until the next night. Life in the third world!...**PJ2T (op. WØCG).** My receive antenna came down 15 minutes after the contest ended...**YV5MBX.** Very good conditions to the United States. Short vertical outperformed the dipole...**PC5M.** Great conditions the first night ...**UA9MA.** Used a better receiving antenna than a transmitting one. Will fix that for the next contest...**VP2E (op. N5AU).** My first 160 contest and everyone was very considerate...**XE2TG.** Never operated 160 until coming to Iraq. FB operators on top band...**YI9VCQ.**

W/VE QRM SSB

Worked North Dakota for 160 WAS...**KC8IVC.** Stayed above 1843 following the ARRL band plan. Missed a lot of DX that I won't missed next year...**W3TS.** Maximized my limited time by looking for multipliers...**WA9TZE.** Where were KH6, KL7, LA, ND, and VE9?...**K8OOK.** Where is KH6CC?...**N7ZT.** Heard D4B but pile-up was too great...**K7ICW.** It's a challenge working the contest with a G5RV and 100 watts...**N1ZN.** Where was the DX this year?...**K1HAP.** Had the flu bug so score was low...**KBØARZ.** Finally made 100 SSB QSOs plus worked Montana for WAS...**WA2ALY.** Noise level seemed better than usual...**KR4BD.** Working D4B. I'm his QSL Manager and am expecting a pile of QSLs ...**K1BV.** My first 160 meter contest after 40 years as a ham...**WA8MGD.** Best SSB QRP effort in years...**W4TMR.** Friendly contest. I knew quite a few of the operators from VHF contests...**AF1T.** Very polite operators in this contest...**W1MKY.** Ran the contest running mobile ...**AJ9J/M.** Worked the contest with a nearly invisible antenna...**ABØO.** My first ever contact with Prince Edward Island...**KI5JF.** Only worked a couple of hours as my back was hurting too much...**AA4LR.** Best conditions I have ever heard to the West Coast...**K5ZD.**

Never thought I could hold a run frequency with low power...**K8MJZ.** Worked D4B with my tri-band beam and the coax tied together ...**KS7T.** Our second effort from the retired wireless site of WSC. Most of the operators were non-contesters before the contest...**N2CW.** Only managed 9 hours due to my heavy work schedule...**NØFW.** Beverages and K9AY receiving antennas let me hear the West Coast and DX such as EA8CAC and UU7J. Now to work on the transmit antenna so they can hear me...**N4XD.** Conditions improving each year as we approach the sun spot minimum...**VE3MGY.** Limited effort due to my wife's birthday dinner Saturday night...**W3BGN.** I am normally a VHF contester...**AI3Z.** Used an inverted V hung from the boom of my C-49XR beam ...**K4SV.** Worked the contest from the desert near Bard, CA while snowbirding with my RV...**KB7Q.** First evening was great. Wish the second could have been as good...**KØGAS.** Heard California and Wyoming for the first time ever on 160 ...**N3UM.** Thanks to Tom, W8JI, and Marsha for letting me work from their great QTH...**N4PN.** Picked up the states needed for WAS plus several new countries...**N4SEA.** Good QSO rates on Friday night but much slower on Saturday and Sunday...**W4PV.** Conditions terrific the second night...**W7OR.**

DX QRM SSB

Been in this contest for over 25 years...**YV2IF.** Surprised that everyone heard my 40 watts...**RX3QDF.** K9AY receiving antenna really helped...**OK1TP.** Just glad to work anyone with my antenna just 7 feet off the ground ...**C6AMM.** D4B was very strong here...**EA6LP.** No computer and no Internet at my QTH...**UA9ACJ.** No propagation here...**HC1HC.** Hope to use PC logging soon...**LY2OU.** Returned from overseas too late to be a factor...**XE1V.** My first ever HF contest...**S56ZZZ.** Band is too narrow in the Netherlands. This even with the expansion a few years ago. Still a pleasure to operate this contest

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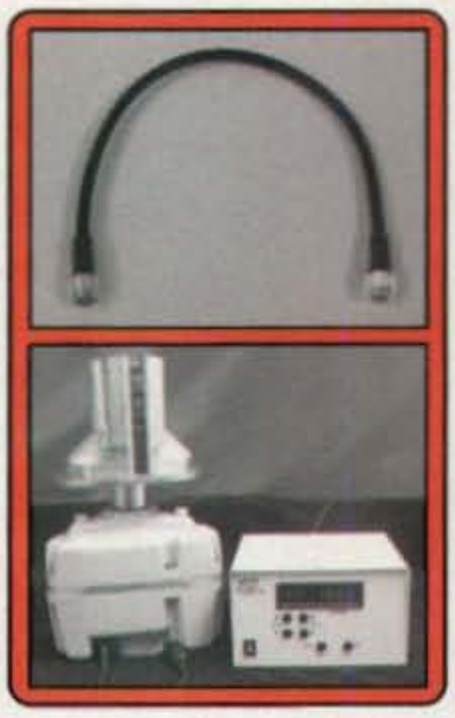

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TOP 10 SCORES 2005

SINGLE OPERATOR

USA CW		USA SSB	
KT1V	699,259	N4PN	390,264
AA1K	621,978	WB9Z	262.602
W4MYA	552,160	W4MYA	235,554
K9DX	527,472	W3BGN	206,560
K1ZZ	506,466	ND8DX	197,659
W3BGN	489,288	KU1CW	174,450
WE3C	434,955	N3HBX	162,675
W1ECT	432,630	W3TS	151,848
NN1N	432,345	WA4TII	131,054
W4ZV	430,023	AF1T	130,575

VE (TOP 5)

CW		SSB	
VE3A	620,000	VY2ZM	952,560
VE2IM	479,325	VE3PN	259,584
VE3PN	305,970	VA3KA	244,742
VE3QAA	277,502	VE3XN	195,640
VE3CSK	262,683	VE3MGY/QRP	87,395

QRP (TOP 5)

CW		SSB	
C4M	280,920	KP4KE	109,800
OM7DX	220,311	VE3MGY	87,395
SN8F	128,790	S57MSU	48,984
HA1ZZ	125,875	VE3KZ	40,592
K3BU	124,915	W4TMR	30,942

DX CW		DX SSB	
D4B	2,919,714	D4B	1,461,376
SN7Q	1,094,828	LY4A	818,100
OK1RF	1,011,125	CN2R	745,080
ON4WW	995.562	P40W	643,356
PJ2T	937,073	HG3M	411,440
VP2E	889,491	OZ1DD	408,852
HA8DU	855,972	KV4FZ	398,886
5B/K3UY	846,769	DJ4PT	292,464
M2D	775,284	HG8R	287,892
DL3TD	750,348	S57DX	245,334

LOW POWER (TOP 5)

CW		SSB	
OK1CF	280,024	S57M	237,928
SV1/LY1DF	278,144	4L2M	141,950
4NØW	275,136	NØFW	98,352
ER5GB	262,683	DJ8UV	87,660
HA6NL	251,505	VE9KAR	76,842

W/VE LOW POWER (TOP 6)

VE3OSZ	227,120	VE3FU	183,677
VE3KP	192,223	VE6EX	150,700
VE5UF	184,405	NØFW	138,591

MULTI-OPERATOR

CW (WW)		SSB (WW)	
VY2ZM	1,591,128	VP5B	762,072
CT3M	1,473,417	UU7J	590,457
MD4K	1,232,078	XE1RCS	466,242
OM7M	985,572	HA8KCK	368,060
CT9C	977,573	EI7M	363,933
VE3EJ	965,550	VE3YAA	347,918
HA3O	924,084	YZ7W	303,310
RK2FWA	915,491	N2CW	302,202
OM8A	869,652	OL1A	280,192
T98U	847,119	HAØIARU	275,795

...**PAØMIR.** Had computer glitches and lost a number of contacts...**C6AMN.** Very pleased to work my first VE with 10 watts on 160...**M3RCV.** Lots of QRM in Europe...**OR5N.** Worked from the Northwest Haiti Christian Mission. Homebrew solid-state water-cooled KW really helped ...**HH4/K4QD.** Good test for my new FT-920 ...**HA1CW.** Poor conditions this year. Next time it will be better...**DC2ZL.** Wet snow detuned my antenna. Still worked about half of the stations called...**DF6WE.** Power was 75 watts, which is the legal limit on 160 in Germany...**DL2OBO.**

(Continued on page 103)

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ICOM

It's been more than seven years since we've taken a really close look at the issues that contribute to the unpredictability of propagation on 160 meters. Here's more information about ducting and spotlight propagation on 160, along with some new information about the day-to-day variability of the ionosphere—the factor that makes it tough for us to predict propagation conditions on Topband.

Ducting and Spotlight Propagation on 160 Meters

BY CARL LUETZELSCHWAB,* K9LA

In their seminal two-part article about propagation on 160 meters back in 1998 [ref. 1], Cary Oler and Ted Cohen, N4XX, discussed, among other topics, ducting on 160 meters. Figure 5 in their Part II showed a 1.8-MHz electromagnetic wave propagating via a duct on a path from Washington, D.C. toward Hungary. They commented, "a considerable number of DX openings on Topband over distances greater than 4,000 kilometers may owe their occurrence to a phenomenon known as *signal ducting*."

The purpose of this article is to expand on the Oler and Cohen article—specifically in the areas of ducting and spotlight propagation. Along the way we'll gain a good understanding of why we need to invoke ducting. We'll also look at a nighttime electron-density profile to physically see the reason for ducting. Then we'll look a little closer at what gets us into a duct and

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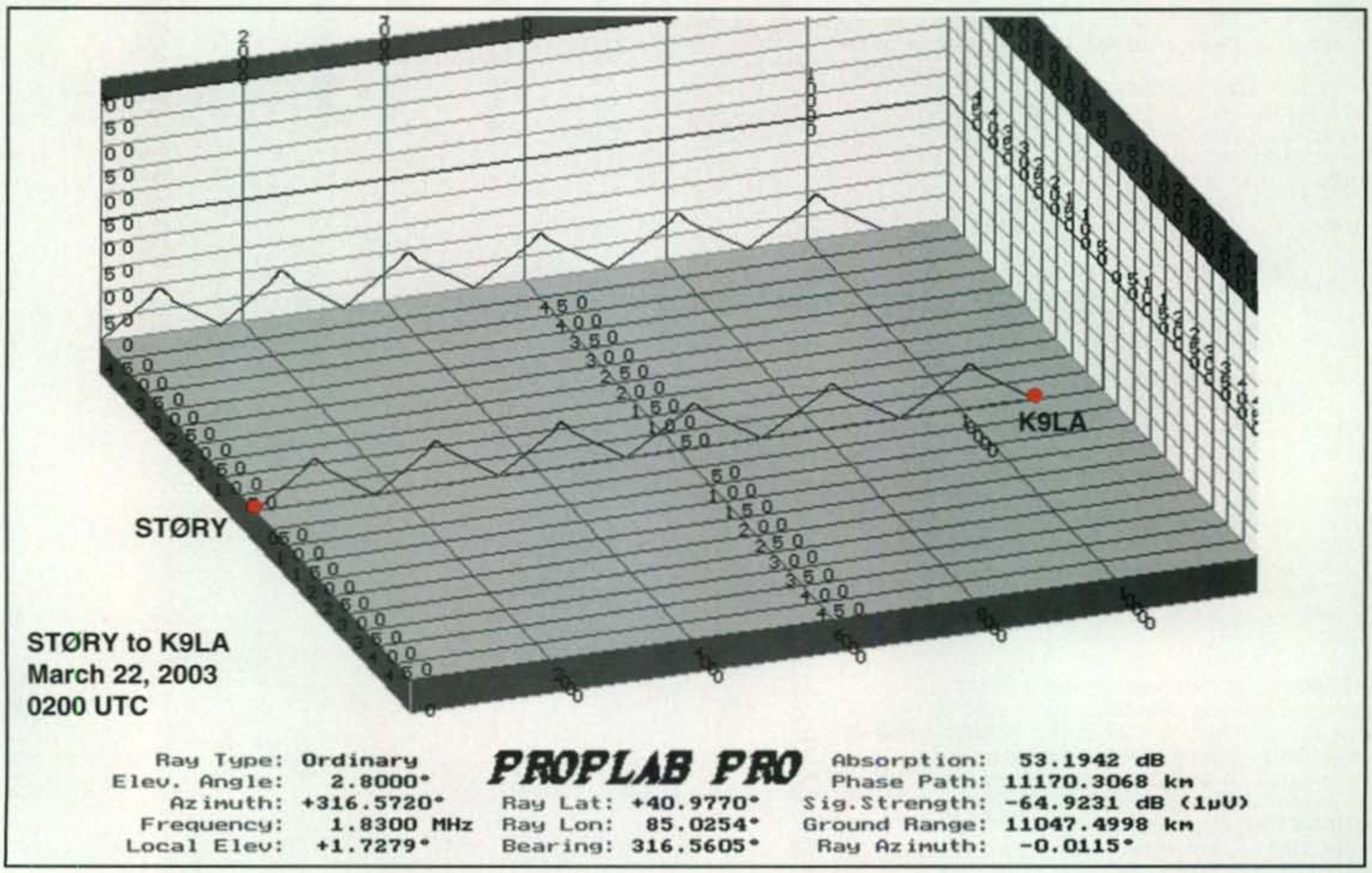

Fig. 1– The best multi-hop mode predicted by Proplab Pro for a path on 160 meters between STØRY and K9LA. Calculations show the signal from Sudan to be 55 dB below the noise floor of K9LA's receiver. In other words, he wouldn't be able to hear them via multi-hop propagation.

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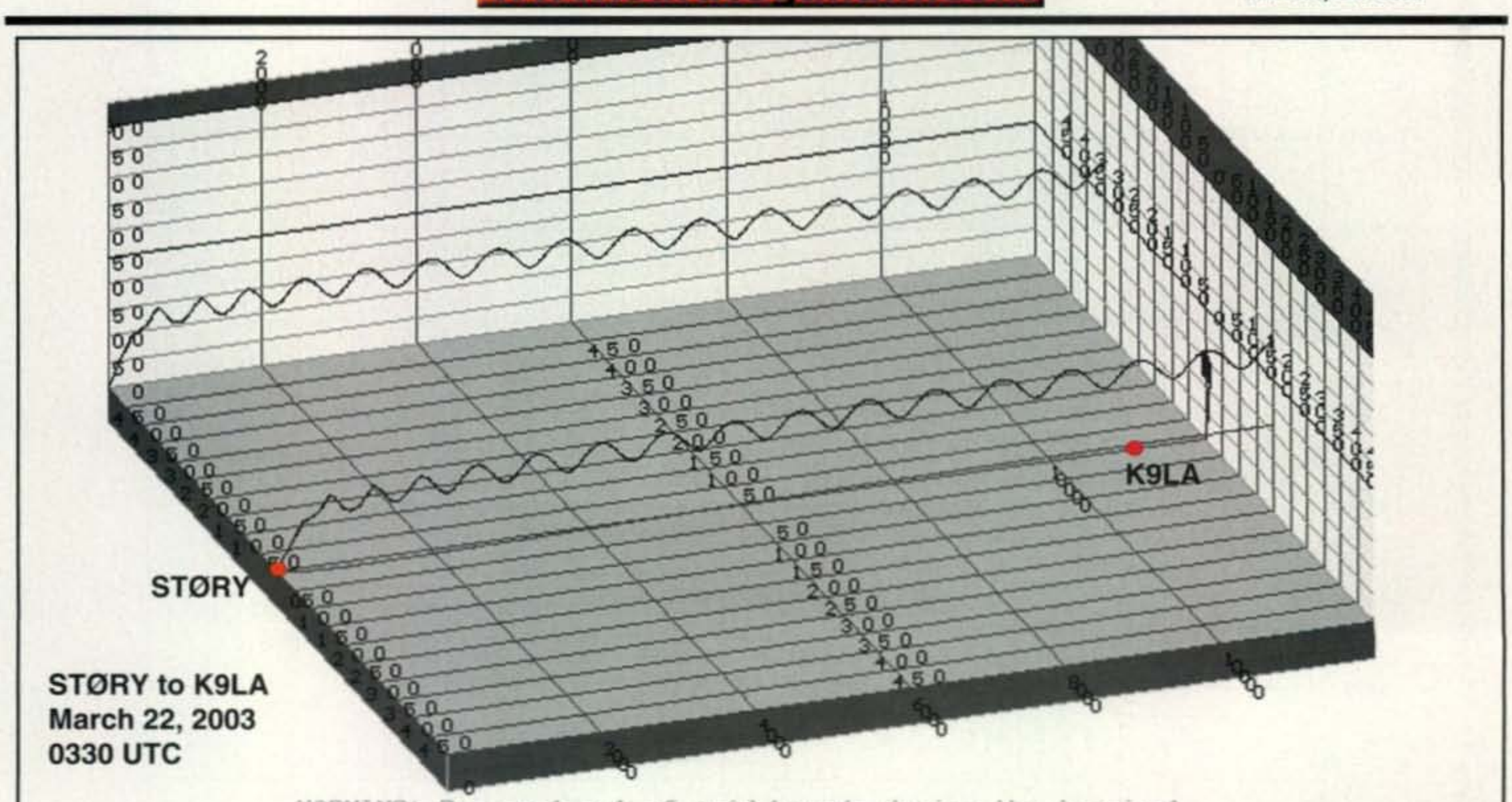

Fig. 2– Proplab Pro analysis of a ducting mode on 160 between the same two points. This results in a readable signal from STØRY at K9LA (see text for details).

what gets us out of a duct in the dark ionosphere. Finally, we'll take a very brief look at the factors that contribute to the day-to-day variability of the ionosphere—the factors that probably make or break propagation on 160 meters.

Multi-Hop Propagation

Let's start by looking at multi-hop propagation using a real-life example. In March 2003 a team of German operators put STØRY on the air from Sudan. They made a big effort on 160 meters during their March 20 to March 31 stay. This was a new one on 160 for me, so I wanted to work them.

The short-path distance from STØRY to my QTH is 11,044 km. My sunset during their stay was around 0000 UTC. Their sunrise was around 0400 UTC. This put the path in darkness for four hours, and it gave me high hopes of putting them in the log.

If we do a ray trace using Proplab Pro [ref. 2] from STØRY to my QTH at 0200 UTC (midway between my sunset and STØRY's sunrise), the best multi-hop mode (in terms of signal strength) is shown in fig. 1.

The resulting field strength is –64.9 dB referenced to 1 µV/m (from the third line in the reported data in the right-most column; note that the "per meter" annotation is omitted after 1 µV in the reported data), which assumes a transmit power of 1 kW at STØRY into an antenna with a maximum gain of 0 dBi (about what a quarter-wave vertical will do over average ground). Translating that field strength to power in 50 W, assuming my inverted-L has 0 dBi maximum gain, gives –158 dBm. This is about 25 dB below the noise floor of my OMNI VI Plus, and more important, it is many more dB below my system noise level when external noise (atmospheric and man-made) is brought into the picture. For example, at my QTH on 160 meters on my inverted-L (I didn't have any Beverages at the time of the STØRY DXpedition), my noise is around –103 dBm in a 500-Hz bandwidth. Thus, STØRY's signal was predicted to be 55 dB below my system noise.[1] In other words, I shouldn't have heard them.

That's essentially what happened. I didn't hear them during their stay, except on two nights. On those two nights (March 22 and March 28) their signal came out of the noise at around 0320 UTC and went back into the noise at 0340 UTC. Unfortunately, I didn't work them on either of those two nights. I couldn't get "K9LA" through the pile-up.

One of two things must have happened for me to hear them on those two nights. Either the amount of absorption along the 11,044-km multi-hop path decreased for 20 minutes or so by at least 55 dB (to take the predicted –158 dBm signal power up to around my noise level of –103 dBm) or a more efficient mode occurred. Coming up with a physical reason why absorption would decrease by 55 dB along this 11,044-km path is tough. Oler and Cohen suggested that one explanation could be due to changes in the chemical makeup and neutral wind patterns following the arrival of interplanetary disturbances,

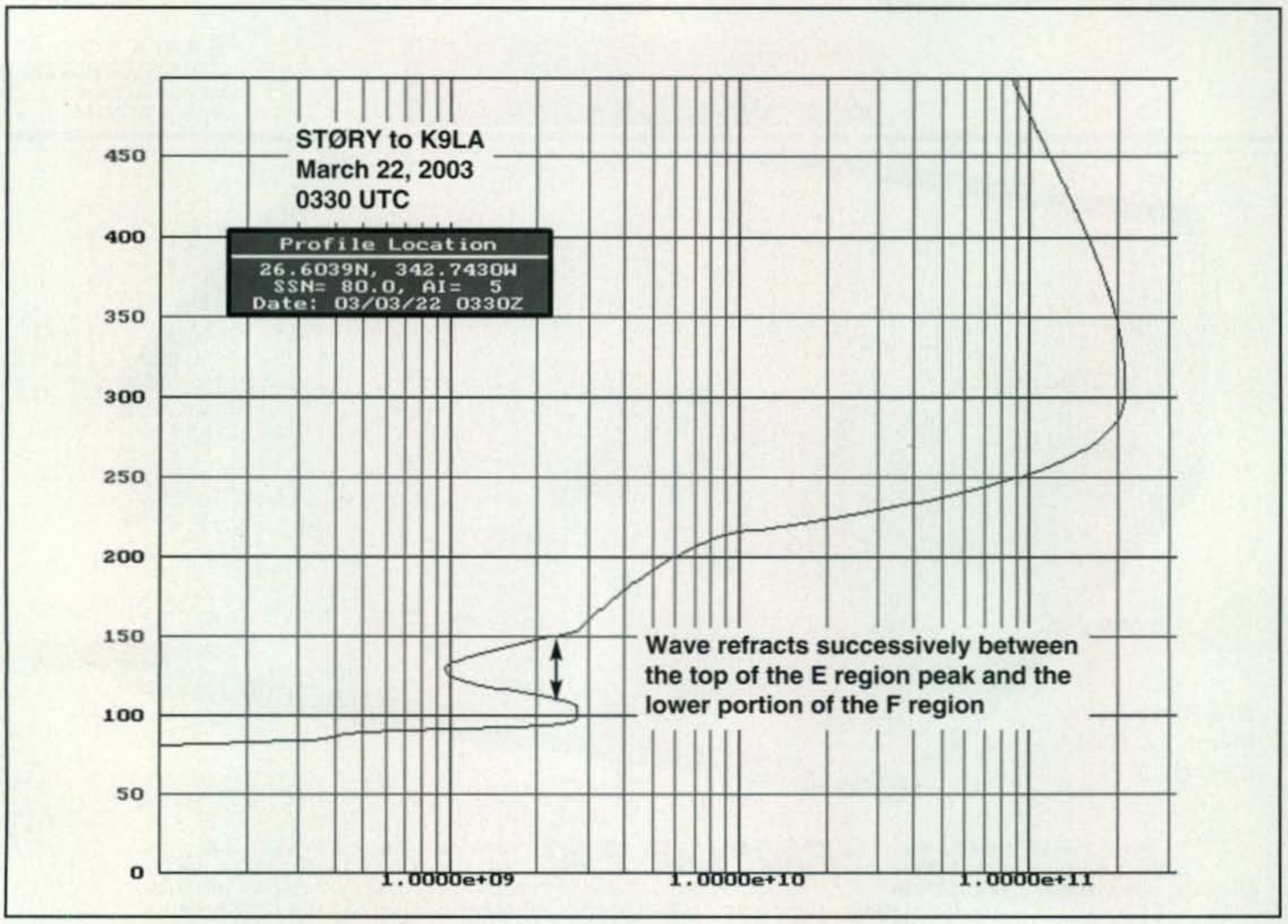

Fig. 3– Electron density versus altitude in the dark ionosphere, showing an irregularity resulting in the formation of a duct between the E and F layers.

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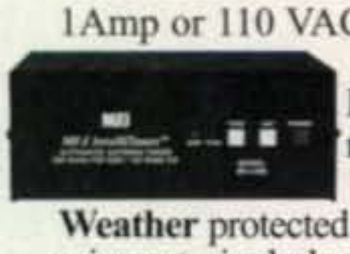

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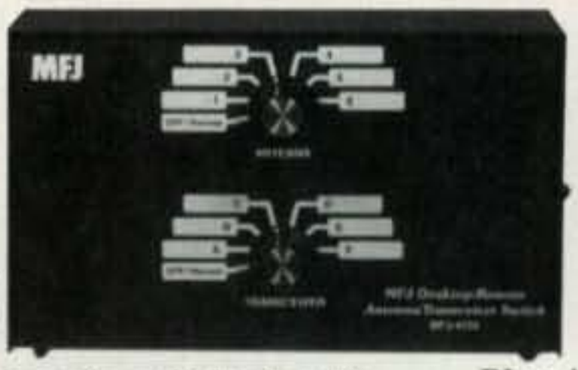

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causing rarefied areas of D-region electron densities. However, there weren't any disturbances during the STØRY DXpedition. This suggests that a more efficient mode may be the real explanation for my observations with STØRY.

Ducting – A More Efficient Mode

Now let's do a ray trace along the same path, but at 0330 UTC, which is the midpoint of the signal enhancement period. Fig. 2 shows this result.

The electromagnetic wave immediately goes into a duct. The resulting field strength of the ray in the duct above K9LA is about –17 dB referenced to 1 µV/m. Translating that field strength to power in 50 W, again assuming my inverted-L, gives –99 dBm. Assuming several dB for absorption for a high-angle down-coming ray at my end of the path gives a signal power that is comparable to my –103 dBm noise. This is a readable signal, and is in the ballpark of my observation of STØRY's signal strength during my enhancement period.

The Physical Mechanism for Ducting

As Oler and Cohen mentioned in their article, there is a good reason for ducting to occur on 160 meters. To see this, let's look at the electron density versus altitude at the midpoint of the path at 0330 UTC. Fig. 3 shows what an electromagnetic wave would see along the path as it travels from STØRY to my QTH. The horizontal axis in fig. 3 is electron density (per cubic meter) and the vertical axis is height above ground in km.

The nighttime ionosphere, under quiet geomagnetic field conditions, has an electron density valley above the *E* region peak.[2] This forms a natural upper and lower boundary for an electromagnetic ray to duct in. Going back to fig. 2 and noting the apogee (about 155 km) and the perigee (about 110 km) of the ray trace when in the duct indicates that it successively refracts between the topside of the *E* region peak and the lower portion of the *F* region.

Getting into the Duct

Since the enhancement in signal strength (from 0320–0340 UTC) occurred as sunrise approached STØRY (which was at around 0400 UTC), it is reasonable to assume that sunrise was responsible for getting into the duct [ref. 3], or at least sunrise helped.

Proplab Pro shows that the range of elevation angles for getting into the duct in fig. 2 is quite small. This makes sense, since two conditions with respect to elevation angle have to be met to get into a duct. The elevation angle must be high enough to get through the *E* region peak. However, it can't be too high, or it will also go through the *F* region. What makes this complicated is the *index of refraction*; it determines how much the electromagnetic wave is refracted. The amount of refraction depends on two critical factors: how close the signal frequency is to the electron gyro-frequency, and the angle between the Earth's magnetic field and the direction of travel of the electromagnetic wave. Even though the ducting mechanism (the electron-density valley) may be present worldwide in the nighttime ionosphere, getting into the duct may be easier on certain paths compared to other paths—even from the same QTH—due to these considerations.

It's also interesting to do a ray trace at the time of fig. 1, at 0200 UTC, which puts STØRY well away from sunrise. Proplab Pro also shows ducting at this time. This is why I commented earlier that sunrise might be more of a helper than an instigator in getting into a duct. The help could be the tilt in the ionosphere that develops as sunrise approaches (there's also a tilt in the ionosphere at sunset), which could favorably impact the critical mechanics of refraction to get into the duct.

Staying in the Duct

Once the electromagnetic wave gets into the duct, it has to stay in it—sometimes for very long distances. That requires the nighttime ionosphere to be stable so that the electron density valley retains its necessary characteristics. Generally this is the case, except as cited in note 2, when electron precipitation from auroral activity can fill in the valley along the high-latitude portion of a path.

Getting Out of the Duct

The ray trace in Oler and Cohen's article came out of the duct because "about 6,500 kilometers from Washington, D.C. the *E* region is no longer ionized sufficiently to refract the signal back up to the base of the *F* region." Obviously, this isn't the case for the STØRY ray trace in fig. 2.

The ray trace in fig. 2 is still in the duct over my QTH. What brought the ray down into my QTH at around 0330 UTC on those two nights? It's not likely that the tilt in the ionosphere at my sunset is the answer, as sunset at my end was three and a half hours earlier. It's also

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Fig. 4– Close-up of a stratus cloud layer. What looks uniform from a distance actually has peaks and valleys. If we could see the ionosphere, it might look very similar.

not likely that the tilt in the ionosphere at my sunrise is the answer either, as sunrise at my end is still eight hours away.

The most plausible explanation for bringing the ray down in the dark ionosphere is an irregularity in the ionosphere. These irregularities are the result of the day-to-day variability of the ionosphere. We know that these irregularities exist, but we don't have a good handle on them (or on the day-to-day variability of the ionosphere, for that matter) because they are so dynamic.[3] The model of the ionosphere in Proplab Pro (the 1995 version of the International Reference Ionosphere) is, for all intents and purposes, smooth and homogeneous in the dark ionosphere, and does not reflect the real-world ionosphere. Thus, for the STØRY ray trace, the wave does not come out of the duct.

I think a very good analogy for irregularities in the ionosphere is a stratus cloud layer. When viewed from afar, a stratus cloud layer looks very homogeneous—like a solid overcast. However, upon closer examination (fig. 4), there are small valleys in the stratus layer, small clumps in the stratus layer, and even possibly some small holes in the stratus layer.

This translates to possible irregularities in the valley mechanism shown in fig. 3. Remember that the amount of

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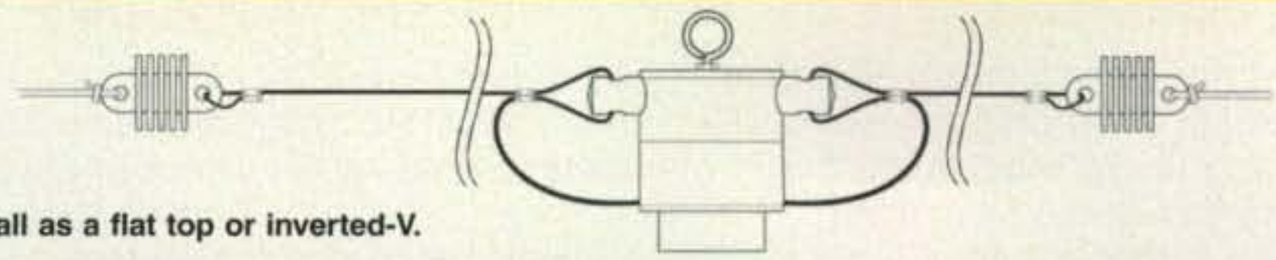

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Table I– Three broad categories of day-to-day F-region variability.

refraction incurred by a wave by a given electron-density gradient is inversely proportional to the square of the frequency. Thus, of all our HF bands, 160 meters needs the least gradient (smallest irregularity) to have an impact on refraction.[4]

For example, looking back at fig. 3, there might be too much ionization in the upper boundary at some point, which would refract an up-going wave down at a steeper angle so that it would go through the *E* region to ground instead of continuing along in the duct. Or there might not be enough ionization in the lower boundary at some point, which would not refract a down-coming wave back up to continue ducting.

To summarize the three sections— "getting into the duct," "staying in the duct," and "getting out of a duct"—I think it's best to say that the entire process of ducting can be a fragile affair, which implies a low probability.

Spotlight Propagation

Spotlight propagation is defined as a small geographic area that is favored with good propagation at any given time. Oler and Cohen suggested that spotlight propagation is simply the unpredictable result of coming out of a duct. I agree wholeheartedly with this, and I further believe that irregularities in the ionosphere are generally the cause.

This is an interesting concept to ponder. It very well could be that there's lots of RF rattling around up there in the duct (based on many Proplab Pro ray traces that indicate getting into a duct and staying in the duct is easier than getting out of the duct), but the luck of the draw in terms of an irregularity to bring the wave down at your QTH in the dark ionosphere determines whether or not you have a QSO.

The Day-to-Day Variability of the Ionosphere

Earlier I mentioned that irregularities in the ionosphere are the result of the day-to-day variability of the ionosphere. It's interesting to dig deeper into this to understand what causes these day-to-day variations.

Two scientists with the Center for Space Physics at Boston University did just that. They analyzed 34 years (1957– 1990) of F_2-region critical frequency data [ref. 4]. Although this was a study about the F_2 region, the results are very relevant to propagation on 160 meters in the lower ionospheric regions.

The two scientists started by listing the causes of *F*-layer variability, which fell into three broad categories as listed in Table I—solar ionizing radiation, solar wind/geomagnetic activity/electrodynamics, and neutral atmosphere.[5] They then determined that the day-to-day variability of the daytime *F* region averaged over 13 ionospheric stations over the 34 years was 20%. They defined variability as a percentage calculated by dividing the standard deviation of the F_2 region critical frequency (foF_2) by the monthly mean value of foF_2 and multiplying by 100.

Next they dug down into the 34 years of data. The result was they determined the contribution of each of the three broad categories to the total variability: Solar ionizing radiation came in at around 3%, solar wind/geomagnetic activity/electrodynamics came in at around 13%, and neutral atmosphere came in at around 15%.[6]

Think about these results. The category that we probably understand the best, solar ionization radiation, contributes the least to the day-to-day variability of the F_2 region. The other two categories are significantly greater than the solar ionizing radiation category and are about equal in contribution. We're learning more and more each day about the contribution of solar wind/geomagnetic activity/electrodynamics category, but I think we still have a long way to go to understand the processes involved in the contribution of the neutral-atmosphere category.

Let me reiterate that the analysis by the two Boston University scientists was done for the F_2 region. However, the three broad categories should be very relevant to the day-to-day variability of the lower ionospheric regions, too, where our 160-meter RF propagates. In fact, I would guess that the neutral atmosphere category plays an even more important role on 160 than it does on our higher HF bands (where the F_2 region is very important). In other words, for propagation on 160 meters in the lower ionospheric regions, the neutral atmosphere category may be a bigger contributor to the total variability than the 15% cited in reference 4 for the F_2 region.

Summary

This article has shown why ducting is needed to explain long-distance QSOs on 160 meters. It also hypothesized that the general cause of spotlight propagation is an irregularity in the ionosphere dumping the signal out of a duct. This article also reviewed some new information about the pertinent day-to-day variability of the ionosphere. Finally, this article suggests, as have others, that complicated processes in the neutral atmosphere are likely to play a very important role in our 160-meter DX QSOs. Unfortunately, we don't have a good handle on these processes yet, so being on 160 every night is the only real way to make sure you take advantage of those "good" nights.

For more information on ducting on 160 meters I strongly suggest reading Brown's article [ref. 5]. Bob, NM7M,

discusses in detail, among other topics, the role of the Earth's magnetic field in ducting.

Notes

1. Based on our present model of the ionosphere, this result says multi-hop propagation on 160 meters at night is limited to much less than 11,000 km with 1 kW and 0 dBi antennas under optimum real-world conditions. A rough estimate indicates that ducting could be the dominant mode for paths longer than 4000 km (as cited by Oler and Cohen) under less than optimum conditions—more external noise at the receive end of a path and less transmit power and antenna gain at the other end of the path. This result may come as a surprise to many—that there's so much absorption on 160 meters at night when the *D* region is, for all intents and purposes, nonexistent. The answer to this is two-fold. First, absorption is proportional to the electron density times the electron-neutral collision frequency, which results in the absorption process moving up to the lower *E* region at night. Second, absorption is inversely proportional to the square of the frequency, which means of all our HF bands 160 meters will suffer the most.

2. The valley develops in the dark ionosphere. The valley is essentially non-existent during the day. During disturbed geomagnetic field conditions, the valley (especially at the higher latitudes) can fill in with precipitating electrons, thus negating the ducting mechanism.

3. This is why Proplab Pro and our other propagation prediction programs use a monthly median model of the ionosphere. After years of data collection, when "what the Sun was doing" was compared to "what the ionosphere was doing," the best correlation was found to be between the smoothed sunspot number (or smoothed solar flux) and monthly median parameters of the ionosphere. This simply says we do not yet have an acceptable daily model of the ionosphere.

4. This is also the reason why 160-meter RF does not get too high into the ionosphere—essentially up to 200 km or so. Thus, when you see someone invoking the F_2 region (300–400 km) for propagation on 160 meters, treat it with some skepticism.

5. The term *neutral atmosphere* refers to the fact that only about one of every one million atoms and molecules in the atmosphere is ionized. Thus, the bulk of the atmosphere consists of neutral (not ionized) particles, and its motion can be influenced by those items in Table I under the "Neutral Atmosphere" column. Since positive ions have the same mass as neutral particles and collide with them at a high rate, positive ions are carried along by the motions of the neutral particles. Electrons then follow the positive ions to maintain charge neutrality. The bottom line is that electrons are tied to the neutral particles, and therefore the ionosphere is subject to the same motions as the rest of the atmosphere.

6. If you're wondering how 3%, 13%, and 15% can add up to 20%, note from the definition of variability that it is a standard deviation. Thus, the sum of squares of the individual standard deviations equals the square of the total standard deviation. Indeed $(3\%)^2 + (13\%)^2 + (15\%)^2 = (20\%)^2$.

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math's notes

BY IRWIN MATH,* WA2NDM

Test Equipment Bargains

In previous columns I have presented my views outlining the merits of purchasing used radio gear, especially when your budget is a prime concern. There are many bargains around, and performance of older rigs is often as good as (or even better than) some of the newer choices. Well, the same is true for electronic test equipment.

Several months ago we needed a way to measure and categorize some wide-band fiber-optic transmission equipment we were designing. After the shock of finding out the cost of 1000-MHz-plus equipment, we immediately started doing extensive research on the internet. What we came up with was indeed interesting, and this month I want to pass along this information to you.

For an oscilloscope we settled on the Tektronix 7310 mainframe. This is a 1-GHz main frame that takes various plug-in units. The 7103 comes in a 7-inch high by 19-inch wide rack-mount package with three plug-in slots. It is also available as the 7104, which is a physically higher but narrower vertical unit and has four slots instead of three. The unit is heavy and fairly deep (a bit over 2 feet), but it is true analog and easily responds to a GHz (or if you are in the digital domain, 2 Gb/s).The cost to us was only $135, which is exceptionally inexpensive! If you don't believe me, look at the cost of new 1-GHz scopes.

Next we needed some plug-in units. Since we had three slots available, we decided on a sweep module and two vertical plug-in amplifiers. The sweep module was the first item we bought. We settled on the Tektronix 7B10, which goes from 2 sec/cm to 200 ns/cm. This unit also triggers to beyond 1 GHz. Cost for this unit was $50, and it came with a calibration sticker from a government lab which indicated that it had been calibrated within the past three years.

The first vertical plug-in we chose was the Tektronix 7A29. This unit has a bandwidth of 1000 MHz and a sensitivity of 10 millivolts/cm to 1 volt/cm. It also has an input impedance of 50 ohms (as compared to 1 megohm for "common scopes"), which we will discuss in a moment. The input can also be AC or DC coupled. This baby cost us $75 and was in excellent (almost new) condition.

For our final vertical plug-in (remember we only had three slots) we chose the Tektronix 7A26. This is a dual-trace unit with a 200-MHz bandwidth and a sensitivity of 5 millivolts/cm to 5 volts/cm. It is more like a common oscilloscope, and it was chosen so that we would have dual-trace capability. Input impedance is also 1 megohm. This unit is quite common and only cost us $25. By the way, it was also in excellent condition.

The final result is a very professional 1-GHz scope for a total cost of $285—truly amazing!

As mentioned above, the 7A29 has an input impedance of 50 ohms, so it cannot be used with standard oscilloscope probes. The reason for 50 ohms is to allow it to be connected directly to many RF circuits. To use this plug-in with RF simply connect a 50-ohm BNC-to-BNC jumper between your circuit and the scope, but be sure to not exceed the maximum voltage (or power) rating of the scope's input. If you need a higher input impedance to prevent circuit loading, you can either purchase an expensive FET-based high-frequency probe for many dollars or build a passive one along the lines of fig. 1.

What we have done here is simply add 450 ohms in series with the 50-ohm input impedance of the scope. This results in a 10X probe with an input impedance of 500 ohms, enough to prevent most circuits from being overloaded. Increase the resistor string to 4950 ohms and you have a 100X probe. When building such a probe, keep in mind that you are trying to view frequencies in the hundreds of MHz, so be sure to construct the probe carefully.

The main purpose of this column is to make you aware that there are many really good bargains out there if you only take the time and effort to look. The Tektronix 7000 series also has many other plug-ins available which range from logic analyzers to spectrum analyzers. Many of these are available for a fraction of the cost of new equipment. Other items we purchased were a Tektronix Constant Amplitude Signal Generator covering 50 kHz to 100 MHz for $55, and a Hewlett Packard Audio Distorion Analyzer for $60. Instruction and service manuals in either CD format or actual paper versions for all are also readily available. You only have to search.

73, Irwin, WA2NDM

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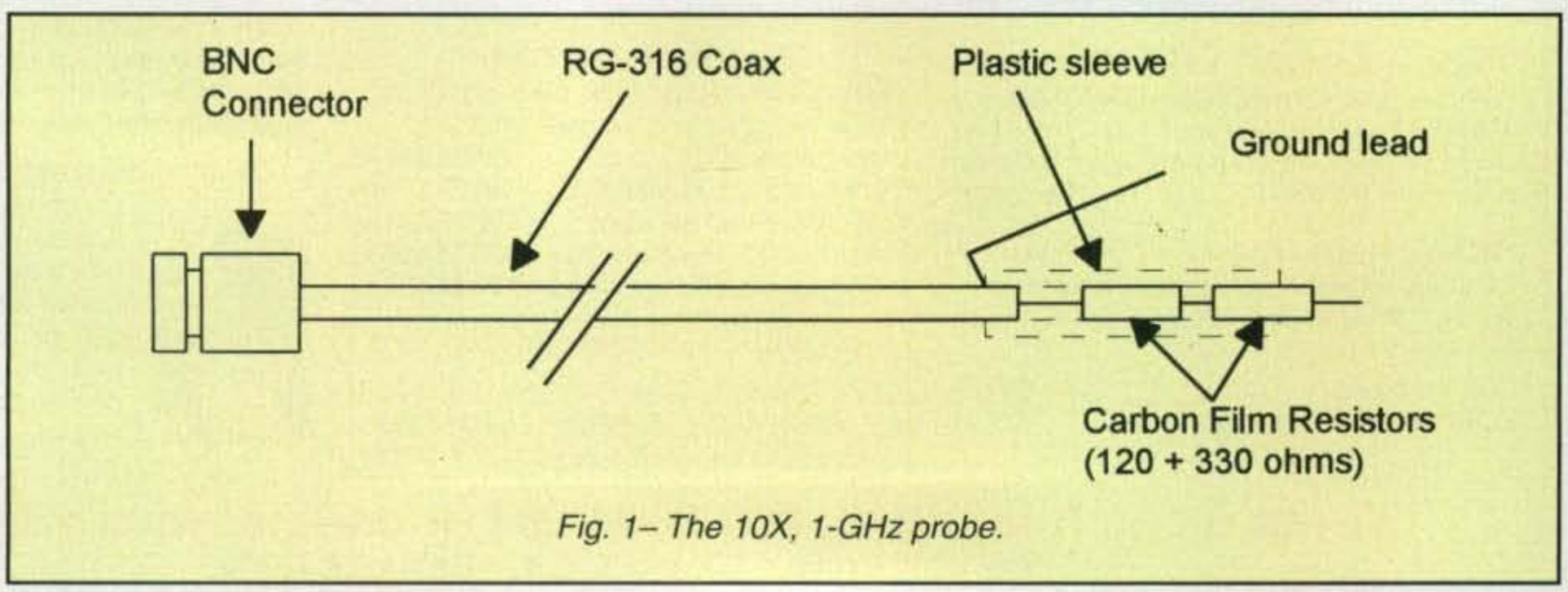

Fig. 1– The 10X, 1-GHz probe.

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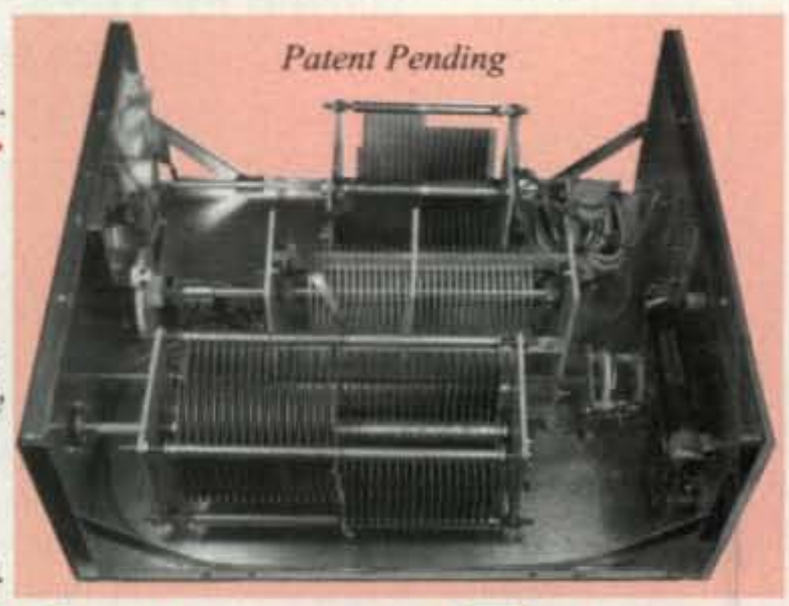

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MFJ . . . The World Leader in Ham Radio Accessories

BY BOB JOSUWEIT,* WA3PZO

Response and Recovery

For nearly two months after Hurricanes Katrina and Rita hit the U.S. Gulf coast, amateur radio operators handled emergency communications on behalf of federal, state, and local emergency management officials; relief agencies; and the National Weather Service. They provided links between the military, Coast Guard, and search-and-rescue organizations. In many cases, amateur radio provided a lifeline for those in need of help.

This month we travel around the Gulf of Mexico and report on stories of amateur radio operators helping in areas affected by Hurricane Katrina and how some of their own lives were affected. As John Pinkard, KD5KXJ, said, "The favorable outcome of this operation is directly attributable to the character, knowledge, skill, and bravery of the many people who voluntarily left their homes and families to help people they for the most part did not even know. The definition of heroism in its truest form!"

Thousands of homes were uninhabitable following Hurricane Katrina. Army MARS volunteer Matthew Hackman, KB1FUP (Warwick, RI), who traveled to Pascagoula, MS, shows one calling card left behind for an insurance adjuster.

Caring for Those Who Could Not Help Themselves

"I am 50 and I thought I had seen everything. But this was the most horrendous thing in my life," said Pinkard, who was deployed with the Mississippi State Guard. He traveled with John Whitten, W5JWW. Both are members of Army MARS. They arrived at the Biloxi Special Needs Shelter located at the Biloxi High School.

"Occupants of the shelter consisted of a total of 1400 persons, mostly nursing home and hospice patients. . . . When we got there you could see most of them had given up all hope," said Pinkard. Many suffered from age-related illnesses. The occupants had little food and were living on half a hot dog twice a day.

"The scene was one of abject horror," continued Pinkard. "A large part of the population was non-ambulatory and had been reduced to relieving themselves where they lay. The smell was almost overpowering!" The staff—three nurses and one doctor—was totally overwhelmed and near exhaustion. They were almost completely without even the most basic of medical supplies.

Upon arrival at the shelter, a communications room was established. The equipment consisted of a very large, heavy Harris commercial HF rig and a Yaesu FT-817 tuned to the local amateur club's VHF repeater. Pinkard said hams were set up at strategic points, allowing contact with the local ambulance dispatch center, Keesler Air Force Base, Mississippi State Police, and the Emergency Operations Centers in Harrison, Hancock, and Jackson counties. Antennas consisted of a half-wave dipole erected between two lamp posts.

Communications from the shelter included requests for ambulance assistance for the evacuation of four critically ill patients, and requests for supplies and materials. While HF played an important role, it was VHF communications that allowed quick access to a wide variety of assets, without which the outcome of the operation would have in no way been nearly so favorable. Pinkard said that not one patient was lost during the week he spent there.

Hams Come Through . . . and Come from All Over

In other areas of Mississippi, ham radio operators from as far away as Connecticut were deployed with the American Red Cross. Ginger Flynn, Coordinator of Disaster Volunteers for the Charter Oak Chapter of the American Red Cross, told *CQ:* "It was my recent pleasure to work with ham radio operators in Mississippi. We had the communica-

John Pinkard, KD5KXJ, provides shelter communication from his operating position just inside the high school entrance. (Photo courtesy of John Pinkard, KD5KXJ)

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tion vehicle, Nextel phones, our personal cell phones, and the internet. The communication was erratic at best. We had six shelters, a feeding kitchen, an operations center, and two staff shelters.

"Until the hams came in and set up, we were unable to have any consistent or reliable communication. We were forced to try to get to all these locations daily, and because of the distance of these locations, that took up most of one day. Since the gas pumps were closed due to no electricity, we tried to conserve what gas we had. That left the shelters and feeding kitchens unable to get their real needs met at times. The hams solved all these problems, and we were able to communicate needs and meet emergency incidents immediately. I had the honor of being asked to do a promo video for the hams and I gladly did it. . . . These men and women take their personal time and fund themselves to make this contribution to the American Red Cross and the American people. They should not only be recognized, but recompensed."

Oklahoma amateur radio operators Ed Compos, K5CRQ, and Mark Conklin, N7XYO, discuss staffing and communications plans for the evacuee shelter at Camp Gruber, OK. (Photo courtesy of Fred Williams, KD5NBR)

Hams Receive Some Aid

The Corporation for National and Community Service (CNCS) provided the ARRL with $177,000 in grant money to support amateur radio operators volunteering in the field in the aftermath of Hurricane Katrina. ARRL Chief Development Officer Mary Hobart, K1MMH, said the "per-diem awards of $25 per day up to a maximum award of four days, or $100 per person, will cover approximately 6000 'ham days' of service." In addition the grant will "strengthen the role amateur radio can play in disaster response by funding the preparation of containerized complete amateur radio HF/VHF stations complete with radios, antennas, feed lines, repeaters, and more," Hobart added. "These are designed for deployment to disaster areas where the amateur radio infrastructure has been compromised or additional equipment is required beyond what's available."

Getting Deployed

Texas hams responded to a call to assist in the Hurricane Katrina recovery efforts. Members of Hill Country REACT and Travis County REACT answered a Labor Day call. They were instructed to report to the Louisiana state OEP (Office of

Emergency Preparedness) in Baton Rouge and receive credentials and be deployed where needed. They left San Antonio at 5:15 AM and crossed into Louisiana about noon. Traffic was stop and go. Not only was the traffic volume high, there were several highway construction projects in progress. By 3 PM they had arrived in Baton Rouge. They were advised by radio to proceed directly to the Washington Parish command center on the outskirts of Bogalusa, which is about 20 miles west of the Mississippi state line and about 75 miles north of New Orleans.

As they headed east from Franklinton to Bogalusa, Charles Land, KA5NKK, began to see more and more storm damage. He said, "This part of the state is a major timber producer, with huge pine forests and many huge hardwood trees. Although most of the trees that were down in Franklinton looked to be dead and weak trees, the situation changed as we went farther east. We encountered groves of large trees that were largely leveled, with the few trees that remained vertical largely devoid of leaves. Since the trees, which are 50–75 feet tall at maturity, tower over the power lines, it isn't hard to picture the result. We saw miles and miles of power lines with trees on them, wires on the ground, and one out of 10 or 20 poles broken off." The same was true for the phone lines.

There was no local ARES organization. The only hams available were those who came into the area. They were assigned to a church in Bogalusa that was distributing food and offering medical assistance. A police officer with a city radio had been their only communications, but he had no contact with the Office of Emergency Preparedness. Lamb told one sad story of an elderly woman who was looking for her house keys in her purse. She had to be reminded that she no longer had a house.

In many areas there were rumors of a gasoline tanker being hijacked. Police were forced to escort relief supplies. Lamb said the nagging problem was how to get fuel to generators, forklifts, and other equipment being used by relief people. (Lesson learned: Don't be dependent on local fuel supplies in an emergency.) The ability to complete outgoing calls was very limited. Cell phones commenced limited coverage, but the ability to make outgoing long-distance calls was spotty at best.

Keeping Track of Our Own

With amateur radio operators providing communications for whomever needed it, it became important for hams to be able to manage their own resources. Lamb told *CQ* that "as the need for our help wound down, most of us were content to return to our jobs. But Roger Wines, W5WIA, was not ready to go home and wanted to find where he could be of assistance. It was very discouraging that he could not find out where he was needed, and he ended up, at the suggestion of a trucker, driving into Mississippi to check in on a repeater to see if there were needs. The trucker said he had heard over that repeater that there were many local operators who needed relief.

"We also discovered a network of amateur operators working shelters and one hospital as a part of the Red Cross operation," said Wines. "We didn't know very much about this operation until the day we were to close up operations. We really need to emphasize to amateurs that they need to do everything they can do to find all fellow

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Fred Williams, KD5NBR, provides the primary communications link between Camp Gruber and the local emergency operations center. (Photo courtesy of Mark Conklin, N7XYO)

amateurs and exchange information as to location and tasks so that cooperation can occur on needs and resources. Even if the agencies we work for don't talk to each other, we can."

Evacuees Moved Inland

As more and more people in the path of Hurricane Katrina were evacuated, virtually all states welcomed some of the evacuees to their areas. In Oklahoma approximately 2500 people were brought to Camp Gruber, a National Guard Training Base.

In the early phases of the disaster, Tulsa area ham radio operators were passing emergency communications that resulted in a few rescues in the New Orleans area. On September 2, Tulsa officials were told that evacuees were coming to the area.

"We sent an ARES Emergency Response Team to set up operations to maintain a link from Red Cross Shelter operations at Camp Gruber to the Tulsa Chapter of the Red Cross," said Mark Conklin, N7XYO. "When I went to Camp Gruber on Sunday 9/4, I found a communications emergency. The VoIP (Voice Over IP) phone system was overwhelmed and crashing, and some groups were using FRS radios and yelling into them. Several of the responding agencies could not talk to one another. Tools that would allow them to talk to each other had been deployed to the larger emergency in the Gulf. So per the request from the OEM folks on the scene, amateur radio stepped in to fill the communications gap."

"We ran a simplex net on base," said Conklin. "We had a two-man net control in Incident Command and up to 11 fixed posts around the base." These included the front gate, Red Cross Operations, Oklahoma Highway Patrol mobile command post, a medical center, and a few more posts. They kept in contact with the Tulsa Red Cross HQ via a VHF repeater in Tulsa, which was some 60 miles to the west of Camp Gruber. As the internet bandwidth improved they used Yahoo Messenger to send written traffic between the Camp and Tulsa.

For eight days amateur radio operators volunteered hundreds of hours to help fill this vital communication need. Conklin said, "We were the communications backbone between the responding agencies." They passed "tons of traffic," including requests for water and food, supplies, and bedding. Amateur radio was the 911 system at Camp Gruber for many days.

With more phone systems added to the camp, the communications emergency was over. Conklin said the Office of Emergency Management, the Red Cross, and the National Guard were very impressed with the "professionalism and can-do spirit exhibited by Oklahoma amateurs."

Lessons Learned

The definition of a disaster is a situation that overwhelms the abilities of the local resources to respond. Lamb says, "Everyone agrees that this is such a situation." Many lessons have been learned, and everyone involved will be much better prepared next time. For amateur operator preparedness, Lamb had the following observations:

• Be prepared with meals – maybe not enough for the duration (unless you are told that no food is available. Eventually, more food will show up at a disaster area than can be consumed, but don't assume it will be there when you arrive, or that you won't be sent to areas where no food has been sent. We took plenty of snacks and did just fine, but we would have tired of them quickly.

• When going to a storm-damage area, a chain saw is a useful tool. Had we arrived on the scene earlier, we would have had to clear trees from the road to get to our destination. We didn't need to mess with tree cutting, thankfully.

• Cross-band repeat capability is a tremendous tool. When dispatched to assist at a site, it is so convenient to be able to work the site with an HT and rely on the mobile for the high power and improved antenna to talk into marginal repeater locations. While many hams prefer to set up a table and be largely non-portable, this requires a two-person team—a radio op and a message handler ("go fer"). With an HT and cross bander, one person can operate a site handily and with greater mobility and be more a part of the event.

• Being self-contained is great, allows you to provide round-the-clock coverage, and gives you a chance to set up in a climate-controlled environment. Not required, but very handy to have. We met a guy who had a very small motor home and an extraordinary radio set up. He had an air-conditioned mobile shack, a place to sleep, and cooking facilities.

• Tools: An antenna analyzer is an important tool. Bring extra connectors of all types, and tools to solder them. Also, there are the universal amateur tools—duct tape and string.

• Internet access is the tool that was missed the most. Communications among amateurs to determine needs and resources was very spotty. Other groups in the area also sorely missed e-mail access. It is strongly suggested that any group that holds itself out to provide a comm. van or communications in general should be looking into how it can make internet access available. That would be a huge resource.

On to Rita

For the past two months we have shared some of the experiences and stories of amateur radio support in the wake of Hurricane Katrina. There are still interesting stories to tell in the aftermath of Hurricane Rita. We'll bring them to you next month.

This time we want to thank Bill Sexton, N1IM; John Pinkard, KD5KXJ; Charles Land, KA5NKK; Mark Conklin, N7XYO; and the ARRL for their help with this column. We thank these and others for sharing their stories with us, and send our gratitude to the hundreds of amateur radio operators who allowed the rest of us to be proud of the slogan "When all else fails . . . Amateur Radio."

Seasons greetings from Philadelphia. Until next month...

73, Bob, WA3PZO

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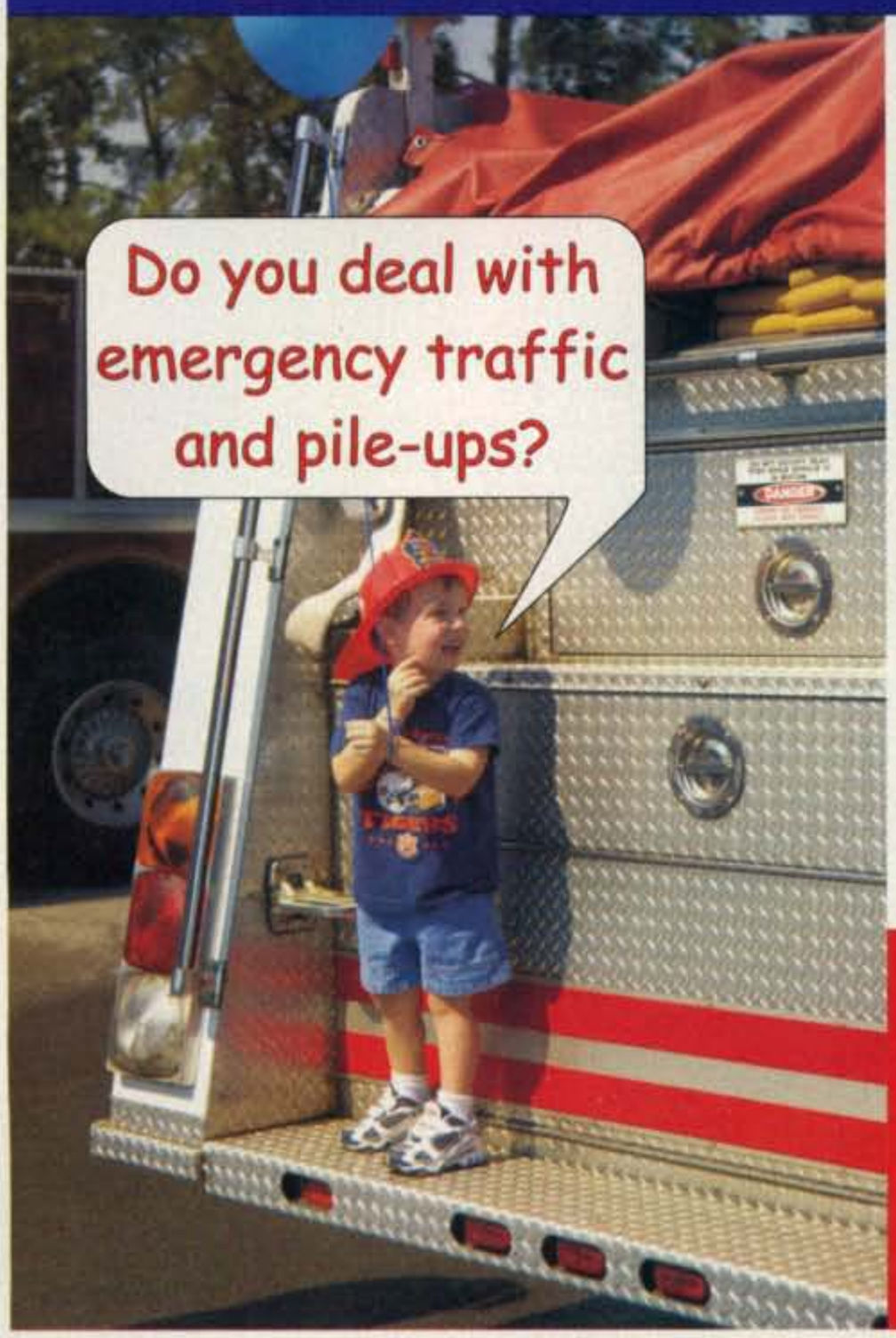

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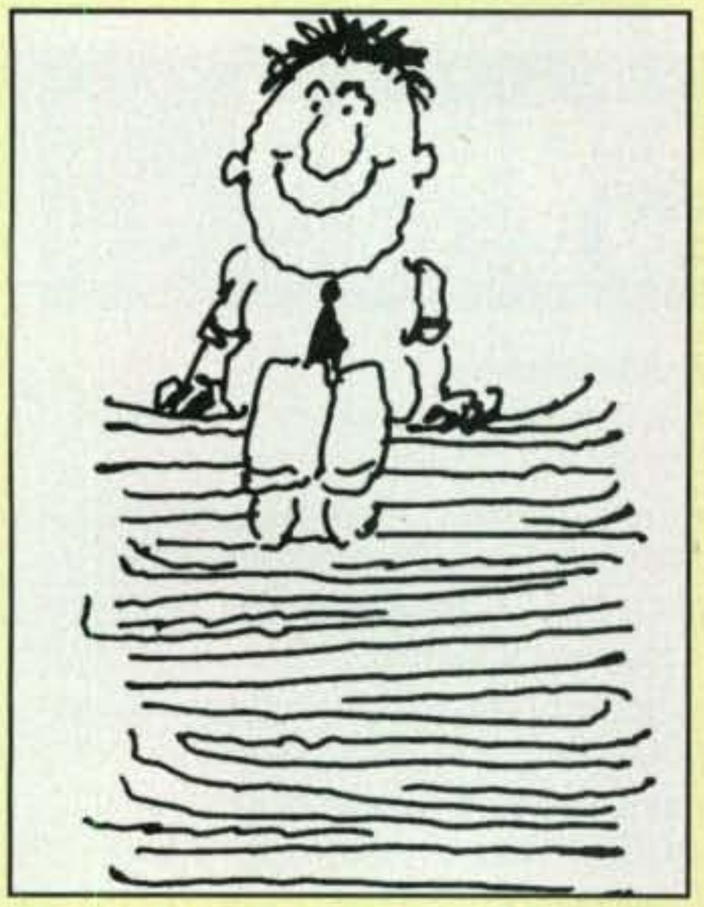

What You've Told Us...

Our September survey asked whether you'd like to see more project articles in *CQ*, and if so, what types. Wow, did we hear back from you!

First of all, for a hobby whose members complain so loudly that "no one builds anything anymore," an amazing 83% of you say you've built at least one project from a magazine article. An overwhelming 78% of you want to see more project articles in *CQ*, with most of you (62%) looking for intermediate-level projects (followed by beginner-level, 25%, and advanced projects, 19%).

The greatest number of you (40%) classified your own building skills as intermediate, followed by advanced (25%), beginner (17%), expert (9%), professional (5%), and no experience but interested in learning (4%). Interestingly, only 2% of you said you had no experience or interest.

What types of projects do you want to see? All sorts of things. From the top... antennas and station accessories (78% each), antenna accessories (63%), transmitters (53%), receivers (49%), transceivers (43%), vintage/tube projects (40%), surface-mount projects (19%), and PIC microcontroller projects (16%).

Now here's the rub ... 40% of you say you would *not* be interested in contributing project articles, with another 37% answering "not sure" and 1% being "not interested in projects." That leaves 21% who would be interested, which actually isn't that bad a number. So if you've got a beginner-to-intermediate level project in any of the areas listed above, take notes and pictures as you build it, then drop us a note to see if it's anything we can use.

This month's free subscription winner is J. Kesterson, W8PP, of Riverview, MI. Happy holidays!

Reader Survey
December 2005

We'd like to know more about you—about who you are, where you live, what kind(s) of work you do, and of course, what kinds of amateur radio activities you enjoy. Why? To help us serve you better.

Each time we run one of these surveys, we'll ask a few different questions and ask you to indicate your answers by circling numbers on the Survey Card and returning it to us. As a bit of an incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to *CQ*.

This month, we've got some special questions in honor of the holiday season.

Please answer by circling the appropriate numbers on the reply card.

1. Have you been a good boy/girl this year?
   - Yes....29
   - No....30
   - Depends on whom you ask....31

2. Have you been a good ham this year?
   - Yes....32
   - No....33
   - Depends on whom you ask....34

3. Do you anticipate receiving a ham radio-related gift this holiday season?
   - Yes....35
   - No....36
   - Sure would be nice (hint, hint)....37

4. Do you plan to *give* anyone (yes, including yourself) a ham-radio related gift this holiday season?
   - Yes....38
   - No....39
   - Can't reveal secret plans....40

5. If Riley deputized Santa Claus and Santa listened to you on the air, what would you be most likely to find in your stocking on Christmas morning? (Pick one)
   - Candy....41
   - Coal....42
   - Coal futures....43
   - A copy of your rig's operating manual....44
   - A copy of The Amateur's Code....45
   - An A-1 Operators' Club certificate....46
   - An Official Observer notice....47
   - An FCC citation....48
   - An invitation to call Riley after the holidays "to discuss some things"..49

6. Getting a little more serious to wrap things up, what are your ham radio plans for the coming year? (Circle all that apply)
   - To get on the air more....50
   - To get on the air, period....51
   - To work more DX....52
   - To *be* the DX....53
   - To upgrade my station....54
   - To upgrade my skills....55
   - To upgrade my license....56
   - To help someone else get or upgrade his/her license....57
   - To be an "Elmer" (mentor) to another ham....58
   - To try a new mode or band....59
   - To clean up my shack....60

Thank you very much for your replies. We'll be back next month with more questions. Happy holidays!

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Ham Radio: Communications Lifeline for Hurricane Katrina Victims

BY FREDERICK O. MAIA,* W5YI

I have been a ham for half a century and have been writing this monthly column for nearly 20 years, and I have never seen anything like it. Federal regulations governing our hobby specifically state that one of the reasons why amateur radio exists is to provide the public with "...a voluntary noncommercial communication service, particularly with respect to providing emergency communications."

Ham operators have often been pressed into service to spot tornados or to assist when regular telecommunications are disrupted or overloaded in a local area. Amateur radio was critical during the early hours after the September 11, 2001 terrorist attack that destroyed the World Trade Center twin towers. Wired and wireless telecommunications as well as the broadcast services went dark without warning.

During 9/11 local Amateur Radio Emergency Service (ARES) and Radio Amateur Civil Emergency Service (RACES) members were deployed across the Greater New York City area to support public-safety and humanitarian communications, as well as the American Red Cross and the Salvation Army. Ham operators who had trained and practiced disaster communications were mobilized within minutes under competent federal, state, and local emergency management. It all was orderly and well coordinated. Despite advance warning, Hurricane Katrina was different, very different.

On Sunday morning, August 28, the National Weather Service sent out an urgent weather message to the public entitled "Devastating Damage Expected" from Hurricane Katrina "...rivaling the intensity of Hurricane Camille of 1969," adding that homes will be "...severely damaged or destroyed ...Power outages will last for weeks ...water shortages will make human suffering incredible by modern standards."

It had long been known what would happen if a large hurricane hit Louisiana and the levees failed in New Orleans, a city that lies below sea level. The following day, August 29, Hurricane Katrina smashed into the Gulf Coast and the levees holding back the sea and water from Lake Pontchartrain crumbled, submerging the city. Thousands of people were stranded and waited for help for several days.

Unlike New York on 9/11, Louisiana was ill prepared to deal with Katrina. Even though officials on all levels were well aware of the potential damage, it appears that federal, state, and local officials in both Louisiana and Mississippi placed little importance on the storm. Both had, after all, ridden out Camille and the levees held. However, this is 35 years later. Even though it had long been recognized that the flood-control system badly needed updating, no maintenance was ever done.

It was a massive government failure with each level pointing fingers and blaming one another for the lack of preparation and proper response. New Orleans Mayor Ray Nagin and Lousiana Governor Kathleen Blanco blamed the federal government, especially the Federal Emergency Management Agency. FEMA said that evacuation and preparation are a state and city responsibility and that specific help was not asked for soon enough.

Supposedly, preparations were to have begun by the city and state at least three days before Hurricane Katrina made landfall, but it didn't happen. Mandatory evacuation was not ordered until less than a day before Katrina hit. Also, FEMA officials were supposed to have had critical resources in place before landfall, and they didn't.

Although largely preventable, what happened was a disaster of unprecedented proportions, far worse than September 11. There can be no doubt that it is the worst catastrophe in U.S. history, and natural disasters may be America's most pressing threat. The chaos that followed is almost unimaginable. Looters, unhampered by police, stripped the city's retail businesses dry.

Amid a qualification dispute, FEMA Director Michael Brown was relieved of his duties by President Bush. He subsequently resigned, as did the New Orleans Police Chief. A national poll places the blame on the mayor, who runs the city, and the governor, who runs the state, agreeing that the president runs the nation and it is not his duty to micromanage local government.

Wired and Wireless Networks Fail

Louisiana Governor Kathleen Babineaux Blanco blasted telecommunications providers for the collapse of the state's wireless and telephone networks. People calling into southern Louisiana, Mississippi, and Alabama got constant busy signals or announcements that "all circuits are busy."

Hurricane Katrina caused a virtual communications blackout in the region, knocking out some 2.5-million BellSouth Corp. telephone lines and disabling more than 1000 cell-tower sites operated by Nextel and Cingular Wireless. The outage completely disrupted the public's ability to communicate with police, fire, hospitals, relief agencies, and other emergency-care providers. It will take years to rebuild the infrastructure destroyed by the storm.

For more than two weeks after the storm amateur radio was the only reliable means of communications in and out of the three states hardest hit by Hurricane Katrina. The American Red Cross's frantic call for communications help was answered

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by hundreds of amateur radio operators from all over the nation. The plea for assistance, transmitted through the ARRL, met with a huge response.

Amateur radio got a windfall of good press as the national media reported on the importance of ham operators for on-site emergency communications. Local newspapers and radio and television stations told how neighborhood hams were traveling to the stricken area or were doing their part by handling health-and-welfare traffic into the Gulf coast for residents unable to contact their loved ones. Stories have appeared everywhere. Here is a sample of some we collected:

***News-Leader*, Springfield, MO** reported that a Nixa ham operator relayed a message from President Bush to the New Orleans' mayor:

Two Ozarks amateur ham radio groups—the Nixa Amateur Radio Club and the Christian County ARES (Amateur Radio Emergency Service) have been relaying messages from people all over the world to those whose communication has been cut off by Katrina. David Beckler, WAØSAP, a ham radio operator from Nixa, even relayed a message Tuesday from the director of the Federal Emergency Management Agency in Texas to New Orleans Mayor Ray Nagin. "The message was from President Bush to the mayor of the city of New Orleans," says Beckler, a New Orleans native who moved to Nixa six years ago.

Hartford Courant, Hartford, CT:

"Amateur Radio Operators Offer Help, Connecticut Volunteers Among Those Headed To Gulf Coast." Oscar Fuller, KB1LQV, is an amateur radio operator and member of Newington-based American Relay Radio League, which is sending volunteers to provide communication support for more than 200 American Red Cross shelters in Mississippi, Alabama and the Florida Panhandle. "Life's been pretty good for me," Fuller, 61, of Danbury said. "This is a way for me to give something back." David Patton, NN1N, an official with the amateur radio group, said that as many as 750 volunteers might be needed and that about 15—including Fuller and Dennis Motschenbacher, K7BV, of Colchester—were among the first to commit since a formal call for help was made. Others, including David Hyatt, K1DAV, of Torrington, are planning to leave later this week. Patton said amateur radio operators will provide a crucial dimension to the relief efforts.

Kansas City Star, Kansas City, MO:

"Ham Radio Operator Tunes in to Help Victims." Wilbur Goll, WØDEL, leans forward in his chair, each hand poised on a radio dial. Goll works quickly and purposefully, turning dials until a strong voice comes over the speakers. "That's a FEMA station in Iowa," Goll says, recognizing the man's call sign. The Shawnee man, a longtime amateur radio operator, or "ham," was off duty after a four-hour shift of handling Hurricane Katrina-related messages through the Shared Resources High Frequency Radio Program. The program, known as Shares, provides the emergency response community with a single, interagency emergency-message-handling system when normal communications are down. Since Hurricane Katrina devastated the Gulf Coast, Goll, 81, has been getting messages to agencies such as the Federal Emergency Management Agency, the American Red Cross and the U.S. Army Corps of Engineers. "I relayed a message to the Red Cross that there were 120 aircraft with pilots available to transport supplies and material," Goll said. "And I also talked to someone in Atlanta who had housing available there for refugees. I got a message that there were some people in an attic who needed to be rescued and was able to get word to the right people," he said. "I also got a message from a group of FEMA workers who were trapped on a bridge that was about to collapse and we got them out of there." The Shares program was established by the National Communications System, which is part of the Department of Homeland Security. It uses high-frequency radio to transmit national security and emergency preparedness information when other means fail. From home, Goll runs the Shares Coordination Station Central, one of three main Shares coordination stations in the United States. The others are in Costa Mesa, Calif., and Houston. "High-frequency radio is one of the only things that can get through to these places," he said. "The cellular sites and telephone circuits were all knocked out."

About.com, an online website:

"Ham Radio Operators Relay Messages, Help Save Lives After Hurricane Katrina." Over 500 ham radio operators are providing emergency communications in the hurricane devastated areas while other systems are still being repaired. Hundreds more are aiding right from their home by relaying messages to families around the country. The Amateur Radio operators, often called "hams," are working in shelters, offices of emergency preparedness and many temporary locations being used in the disaster response. Because of their communications work, hundreds of lives have been saved already. Hundreds more ham volunteers are in neighboring states and ready to come in once emergency organizations are able to enter the affected areas. In addition to providing emergency communications for various agencies, hams are aiding by informing the thousands of anxious families about people trapped in the area. Hams have coordinated nation-wide to allow many victims to tell distant families about their status.

Connecticut Post, Bridgeport, CT:

"Ham Radio Operators Await Call to Help." Amateur radio operators are standing by to assist with communications in New Orleans and the Gulf Coast states, said officials with a Ham radio group with members in Stratford and elsewhere in the region. "When all else fails, we kick into motion," Robert Betts, N1KPR, member of the Stratford Amateur Radio Club, said, referring to the Ham operators' ability to facilitate communications in extreme conditions. When power lines are down or cell phones and telephones are disabled or overwhelmed, amateur operators are able to keep communicating using battery-powered mobile equipment. "We are like a telegraph service that is just waiting there," Betts said of the Hams' history of maintaining communication in natural disasters. As many as 300 amateur operators in the Gulf states are handling messages going out of the disaster-stricken area. Ham operators in Connecticut have received messages from people in the disaster zone trying to let friends and family know they're OK.

Sun News, Myrtle Beach, SC:

"Ham Radio Operators Help After Disasters" For ham radio operators, Hurricane Katrina's aftermath is providing another chance to deploy the old-fangled—but dependable —communications service that has been a help in previous disasters. Unlike cell phones and the Internet, ham radios can handle massive surges in traffic and rarely succumb to technical glitches. Operators traveled to the scenes of the Sept. 11, 2001 terrorist attacks and 2003 space shuttle Columbia explosion, among other recent events. "Since all normal means of communications are essentially nonexistent in the affected areas, amateur radio has become a critical element in relaying urgent information," said David Gore, W5DSG, of Monroe, La., one of the ham radio operators helping to deal with Katrina. About 250 operators are in Louisiana working with the American Red Cross and state emergency response officials, with others waiting to enter the state when flood waters recede. Greg Sarratt, W4OZK, of Harvest, Ala., said he planned to head to Jackson, Miss., to set up a communications system to provide similar assistance.

KLTV Television, Tyler, TX:

"Ham Radio Operators Try To Help Locate Loved Ones of Evacuees." There are still many evacuees who have not seen or talked to their loved ones for days, and communication is finally now starting to reach the affected areas. Rusty Walker, KC5ACU, works for the East Texas Emergency Service and is a ham operator. He helps the American Red Cross get the supplies they need by communicating with other agencies using his radio, cell phone or the internet. Right now, he's helping evacuees locate their family and friends. "We are just now being able to get some good communications into those affected areas," said Rusty Walker, ham operator. "We have those operators that have their hepatitis and tetanus shots and everything and they are going in however means they have to get in there and get equipment set up, so they can pass messages out saying John Doe is all right."

Delaware's *Harrington Journal*:

"Ham Operators Lending an Ear: Downstate radio enthusiasts offer storm relief aid" Ham radio operators Zed Postles, N3FZP, of Dover and Jerry Palmer, KC5YCV, of

Houston are assisting in hurricane relief by relaying over-the-air information. "When all other forms of communications fail, there is always ham radio," Mr. Postles said. "We can operate when everything goes out. The hurricane hit Monday and at 8 a.m. Tuesday the hams were on the air," Mr. Postles said. "And have been on the air ever since." Since Tuesday, most of the radio traffic has been requests for supplies, relays to Red Cross and Salvation Army shelters, requests to help people trapped in their houses and health and welfare checks. "Anything you can think of, it's come across the radio," Mr. Postles said.

KRGV, Channel 5, Weslaco, TX:

"Ham Radio may be Key to Communicating" Ham radio operators could be a link to family members in hurricane-stricken areas. The city of McAllen and Weslaco joined forces this week to set up a call center using ham radio operators. Mayors from each city announced "Operation: Reaching Out" will be a free service. "The ham operator will contact the ham operator in the area affected and try and determine where these people may be," explained Weslaco emergency management coordinator George Garrett.

The Daily Home, Talladega, AL:

"Ham Radio Association Helping Displaced Families Locate, Communicate with Each Other" The Coosa Valley Ham Radio Association is trying to help Hurricane Katrina evacuees find their loved ones, and hopefully, will find them alive and well. Coosa Valley Ham Radio Association operator Ben Owen, N7LBW said the group is having evacuees in Pell City fill out message forms and local ham radio operators will transmit the messages to other ham radio operators in or near cities where evacuees' families live. "They (ham operators in Mississippi and Louisiana) will try to contract that person any way they can," Owen said.

Tallahassee Democrat, Tallahassee, FL:

"Local Ham Radio Operators Help Rescue Effort." Tallahassee ham-radio operators took part in the daring helicopter rescue Friday of about 1,500 patients and staff from two New Orleans hospitals besieged by darkness, dank water and gunfire. Enter the Tallahassee Amateur Radio Club, Florida Division of Emergency Management and some old-fashioned ingenuity. Urged by rapidly rising water—8 feet deep in places—and the growing knowledge that New Orleans had become a drowning pool, the ham operators fashioned a satellite reception device atop an 8-story building in downtown Tallahassee. Then three of them—Theo Titus , K4MVL, Gene Floyd, AI4KK and Bill Schmidt, K4JOG—all boarded a helicopter in Tallahassee Wednesday and headed for New Orleans. Atop the garage at Tulane HCA hospital, they set up a generator-powered ham radio with a satellite uplink....

Channel 3 KIDK-TV, Idaho Falls, ID:

"Use of Ham Radio Connects Mother and Son" A Sugar City woman was finally able to get in contact with her son in Biloxi, Mississippi. She tried many outlets to contact her son, but was not successful. So, she turned to the Salvation Army, which was able to get news out to the area by using a system called SATERN, the Salvation Army Team Emergency Radio Network. "It's a group of Ham Radio operators that work on a volunteer basis to help get messages out in times of disaster," says Jonathan Cederberg of the Idaho Falls Salvation Army.

Washington Post, Washington, DC:

"Ham Radio Operators Aiding Katrina Effort" Arkansas ham radio operators are monitoring transmissions from areas ravaged by Hurricane Katrina, sometimes chiming in to aid in communication. Dale Temple, W5RXU, president of the Central Arkansas Radio Emergency Net, said the first transmissions from the devastated region started to pour in on Monday. "Canal Street ... trapped in a building ... one person with a wheelchair ..." When Hurricane Katrina knocked over cell phone towers and utility lines, ham radio became the best way to go, Temple said. Ham radio operators helped communications between Louisiana hospitals needing help and Arkansas aid workers who were unable to get in touch with them, Temple said. He said he even heard President Bush on Tuesday try to radio New Orleans Mayor Ray Nagin, who wasn't available at the time.

St. Petersburg Times, St. Petersburg, FL:

"Ham Radio to the Rescue" One of the first casualties of Hurricane Katrina was technology. Without working telephones and only intermittent cellular service, many New Orleans residents had no means to communicate their situation to the outside world. That's when the primitives of high tech–ham radio operators–came to the rescue. On Monday, an Oklahoma woman got a cellular phone call from an elderly aunt in New Orleans who said she was trapped on the second floor of her house. Then the cell phone went dead. The Tulsa woman contacted her local Red Cross, which turned to Ben Joplin, WB5VST. As a member of a ham radio network that responds to emergencies, Joplin couldn't reach anyone in New Orleans, but he did pass the message on to a fellow ham in Oregon. From there, the message was relayed to another amateur radio hobbyist in Utah, who was able to get through to ham operators in other parts of Louisiana. Through that circuitous route, New Orleans emergency personnel were notified. When rescuers arrived at the house, they found a dozen people, including the 81-year-old who made the first call. That happy ending is a reminder that even in modern times, a horse and buggy is sometimes the best way to reach your destination.

WMUR-TV Channel 9, Manchester, NH (9/1/05):

"Ham Radio Operators Provide Lifeline During Disaster" People in the Hurricane Katrina disaster zone are desperate not only for food and water, but also information. Amateur radio operators from around the country are providing a voice to the outside world that has been missing since Katrina struck. From his home in Meredith, Greg Sheard, WI1P, hears the calls for help coming from the Gulf Coast. Since the storm Sheard has been listening for eight hours a day. He heard a life-saving transmission when ham radio operators from New Orleans to Utah coordinated the effort to guide a Coast Guard helicopter to rescue more than a dozen trapped people. "These people were saved. Their lives were saved because the ham radio operator could get through to other operators when all other technology was down," said Karen Hardman, of the Salvation Army.

Newhouse News Service:

"Ham Radio Operators Rise to Occasion of Another Disaster" For ham radio operators, Hurricane Katrina's aftermath is providing another chance to deploy the old-fangled—but dependable—communications service that has been a help in previous disasters. Unlike cell phones and the Internet, ham radios can handle massive surges in traffic and rarely succumb to technical glitches. "Since all normal means of communications are essentially non-existent in the affected areas, amateur radio has become a critical element in relaying urgent information," said David Gore,W5DSG of Monroe, La., one of the ham radio operators helping to deal with Katrina.

KCRA-TV, Channel 3, Sacramento, CA:

"Amateur Radio Operators Hear Desperate Pleas For Help" Ham radio operators are making contact with people on the Gulf Coast and hearing desperate pleas for help. With most phone lines down, ham radios have become an important way to communicate in the disaster area. With 67 years of experience, Jettie Hill, W6RFF, of Roseville, has been using his ham radio to listen to calls for help from the Gulf. "The amateurs in most of these hurricanes provide nearly all the communication," Hill said. What makes amateur radios so important in times of disaster is that they are very portable, they can operated with batteries and they don't require an infrastructure like cell phones or the Internet. Ham radio operators from across the country have been sent to the disaster zone to use their equipment to help with communication in the Gulf region.

KSL Radio, Salt Lake City, UT:

"Amateur Radio in Utah Saving Lives in Disaster Area" A Utah man has helped save more than a dozen lives in the Hurricane Katrina disaster and all without leaving his basement in Grantsville. He may even have helped save a New Orleans police officer. Rick Cain, W7KB, of Grantsville calls his basement room his radio shack. For days his antenna has been picking up ham radio traffic on the disaster. On the Gulf Coast, amateur radio is a lifeline because most phones don't work. "Yesterday I took traffic on a police officer who was stuck in the attic of his house. And he had a cell phone with him and he couldn't call his own office from New Orleans!"

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SS-18	15	18	1⅛ x 6 x 9	3.6
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SS-30	25	30	3¾ x 7 x 9⅝	5.0

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SS-30M*	25	30	3¾ x 7 x 9⅝	5.0

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SRM-30	25	30	3½ x 19 x 9⅝	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅝	6.5
SRM-30M	25	30	3½ x 19 x 9⅝	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30-2	25	30	3½ x 19 x 9⅝	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅝	11.0

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SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service

Journal Sentinel, Milwaukee, WI:

"Ham Radio Operators Reach Out and Help Hurricane Survivors" Huddled around a collection of ham radio equipment in a basement in Franklin, Bob Albert, AB9FB, and Don Uecke,WA9ERI, listen attentively to radio traffic from areas devastated by Hurricane Katrina. With cellular and landline phone systems destroyed by the storm, a network of amateur radio enthusiasts are helping people trapped in the affected areas communicate with loved ones across the world. Albert, president of the Milwaukee Repeater Club, like several hundred licensed ham operators throughout the region, has had his ears glued to an emergency frequency established Wednesday morning. The system allows operators to listen to traffic from their counterparts in Louisiana, Mississippi and Alabama who are running radio systems on generators and batteries and in some cases put people in touch with or relay messages with their Wisconsin relatives

The Roanoke Times, Roanoke, VA:

"Ham Radio Operators Provide Vital Link" Gary Hendrick, KB4IPR, sat on a stool in his garage in Craig County and fiddled with the knobs and buttons of his ham radio. He was frustrated because the signals were weakening in the late afternoon. Then an urgent voice sliced through the static, clear as a bell. "I have a diabetic, 80 years old, out of food and water for the last 24 hours," it said. An elderly woman from Bush, La., was stranded in her home after Hurricane Katrina and desperate for food and insulin. Somebody sent the message out over the air. Other voices picked up the call and it was relayed all across America until, with luck, it would reach a local rescue squad. With cellphones, land lines and e-mail knocked out by the storm, amateur radio operators have become the only link to the outside for some people stranded by high water. Radio operators have become like shortwave carrier pigeons alerting rescuers to stranded victims and reassuring families about loved ones cut off from communication. In a way it's sweet revenge for what Hendrick calls the "lost art" of ham radio. With younger generations gravitating toward newer technologies, it takes a disaster to remind people that no amount of destruction will knock out basic radio traffic.

TV 9 News, Denver, CO:

"Ham Radio Operators Help Track Down Hurricane Victims" A lack of power and phone service has cut off virtually all communications within New Orleans and other devastated areas. But ham radio operator Richard Ferguson, KAØDXM, says it doesn't take much to operate a shortwave radio. ...Here in Denver and other Colorado cities, including Larkspur and Colorado Springs, the volunteers have been relaying messages to emergency service workers on the Gulf Coast in hopes of connecting hurricane victims with *relatives* across the rest of the country.

MSNBC Television:

"Ham Radio Operators to the Rescue after Katrina. Amateur Radio Networks Help Victims of the Hurricane." Often unsung, amateur radio operators regularly assist in emergency situations. Hurricane Katrina was no exception. For the past week, operators of amateur, or ham, radio have been instrumental in helping residents in the hardest hit areas, including saving stranded flood victims in Louisiana and Mississippi. And, for the first time, the federal government will help hams help others. The Corporation for National and Community Service (CNCS) will provide a $100,000 grant supplement to ARRL to support its emergency communication operators in states affected by Hurricane Katrina. The grant will help to fund what is being termed "Ham Aid," a new program to support amateur radio volunteers deployed in the field in disaster-stricken areas.

Computerworld:

"Ham radio volunteers help re-establish communications after Katrina" With power still out in much of the region and telephone service restored in limited areas of New Orleans, the Mississippi cities of Biloxi and Gulfport, and other hard-hit areas, ham radio operators have been asked by the American Red Cross and other agencies to supplement communications at more than 200 storm shelters in Mississippi, Alabama and the Florida panhandle. Some 700 ham radio volunteers from around the nation are already at work helping in the efforts, with more on the way. On Sunday, the American Red Cross asked for about 500 more radio operators to assist at shelters and food kitchens set up to aid evacuees. The volunteers are driving to needed areas and meeting with officials at staging areas in Montgomery, Ala., and in Oklahoma and Texas, where they are being dispatched to disaster shelters. The ham radio operators travel to the disaster areas using their own vehicles and pay their own way.

Georgetown Record, Beverly, MA:

"Ham Operator Helps Ravaged South" An invisible army of amateur radio operators across America is taking turns on the airwaves to provide desperately needed emergency communications in the Gulf States devastated by Hurricane Katrina. One of those operators is Arthur Greenberg, K1GBX, who operates a powerful ham radio station on a military frequency from his Georgetown home. On Friday, Greenberg was asked to take shifts as a Net Control Station Operator for the Salvation Army Team Emergency Radio Network, SATERN.

WBNS-TV Channel 10, Columbus, OH:

"Ham Radio Operators Relay Information" Dozens of local men and women are helping the victims of Hurricane Katrina from the comfort of their own homes by getting information to people hundreds, and even thousands, of miles away. From his Westerville home's second-floor radio room, Bill Carpenter, AA8EY, is in touch with the world. Carpenter is a 43-year ham radio operator who's helping relay messages to and from the hurricane disaster zone, including the message he got from an injured man in the Gulf. "Cell phones are good up to a point. Telephone land lines are good up to a certain point. The only failsafe communication that we have in this country, or in the world, is amateur radio," says Carpenter.

Hattiesburg American, Hattiesburg, MS:

"Ham Radio Operator Finds Skills Still Needed" For many volunteers helping Pine Belt victims of Hurricane Katrina, the tools of their

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trades include chain saws and lunch lines. But for retired Hillsville, VA, machinist Glen Sage, W4GHS, high-frequency transceivers, power meters, a microphone and headset are his tools. Sage is a volunteer ham radio operator helping the American Red Cross coordinate communications between its shelters and kitchens. "With cell phones and land lines nowadays, a lot of people see this kind of communication as being a little archaic," Sage said. "But we've never been more needed than today." He arrived in Hattiesburg, MS on Monday and has been operating out of the American Red Cross headquarters on Hutchinson Avenue. Sage expects to be in the Pine Belt for about 10 days. "I've been in a lot of disaster relief efforts, some more intense," Sage said. "But I've never seen one as massive and far-reaching as Katrina."

***Harrison Daily Times*, Harrison, AR:**

When Louisiana residents cry for help, Don Poisson, KC5BPQ, is there to listen. Poisson is one of 3,400 amateur radio operators participating in the Salvation Army Team Emergency Radio Network (SATERN), a group of volunteers monitoring the airwaves for emergency calls in the wake of Hurricane Katrina. "In a world of cell phones and broadband DSL, communication being eliminated has really been a wake-up call for the world," Poisson said. "Time and again, ham radio has proven itself. When disaster strikes, this is what is left."

***The New York Times*:**

"Lacking Phone Lines, Rescuers Turn to Ham Radio" The 500-pound man on the deck of a shrimp boat along the coast of Gulfport had been lying there for three days and needed medical attention fast. Their options dwindling, one of them used his radio to call an emergency center in town, where, he remembered, there was an amateur radio operator. "The situation was getting pretty dire, because this guy had serious medical complications," said Mark Bort, KA1ZIA, the amateur operator who took the call and notified a Coast Guard helicopter, which rescued the man. All over Louisiana, Mississippi and Alabama, a volunteer army of nearly 1,000 amateur radio operators have stepped in to help fill the communications void that was left when Hurricane Katrina snapped telephone poles and toppled many cellphone towers. These ham operators suddenly find themselves in great demand: the Coast Guard, the American Red Cross and the Federal Emergency Management Agency have all made requests in the last week for more volunteer operators to handle communications at hospitals, evacuation centers and emergency operations facilities.

WNEP-TV Channel 16, Scranton, PA:

"Area Ham Radio Operators Helping out in Gulf Region" Along the Gulf Coast, hams are using their signals to relay messages about rescues and supplies. Saylorsburg operator, Pete Gitler, KB3HGG, has been a ham for about four years. "We don't necessarily have to rely on infrastructure to operate. We can just throw it up in the middle of a field somewhere and we're on the air and ready to go," explained Gitler. They rely on generators or solar power, and antennas to bounce their signals off the atmosphere. And some people from our area are going to help. A group of hams from Monroe County were dispatched to New Orleans, to set up a station in an area that is still without communications.

***Valley News Dispatch*, Pittsburgh, PA:**

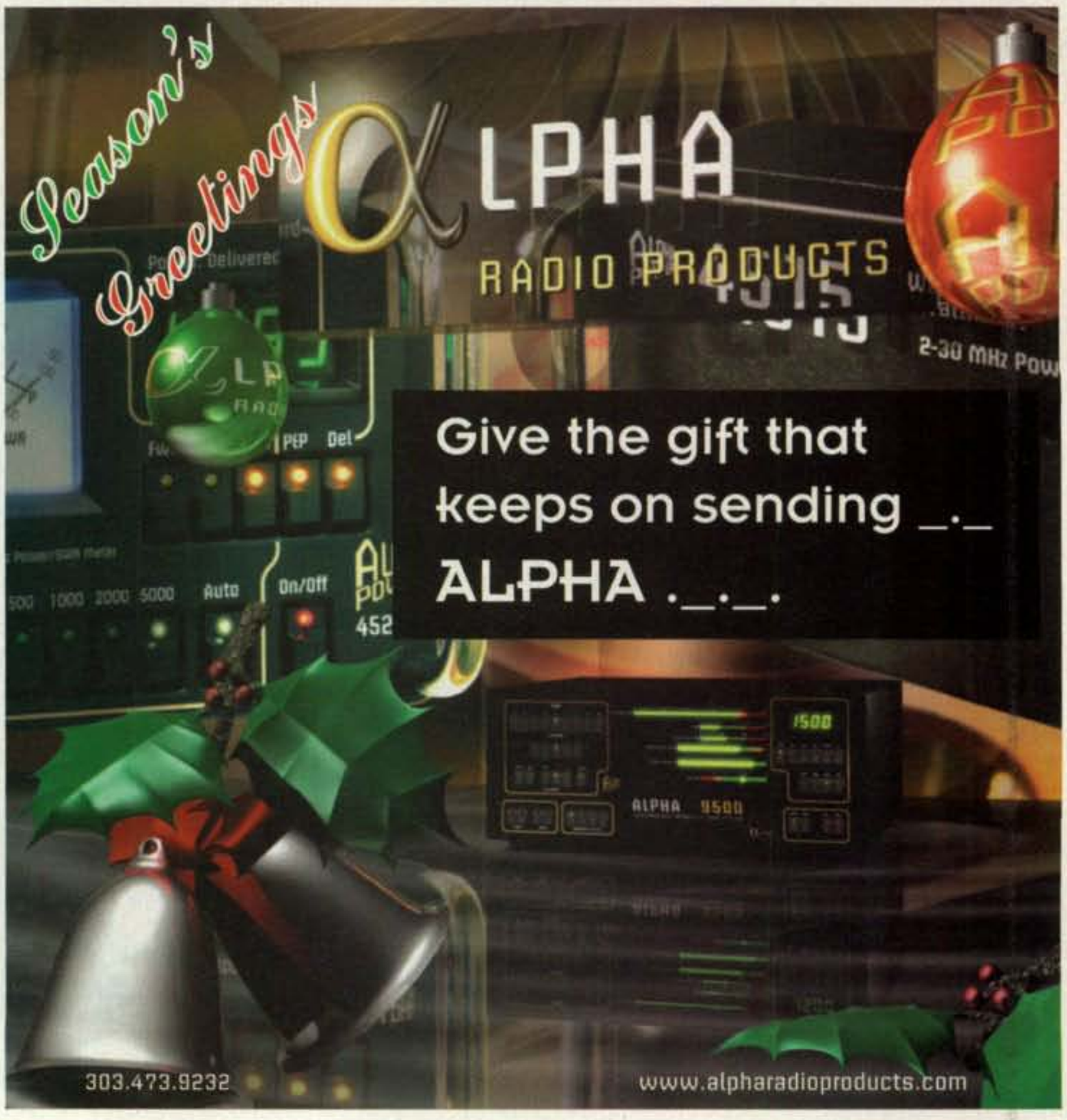
Two members of Upper Burrell-based Skyview Radio Society are among a group of six people headed to Mississippi to help with communication efforts in the flood-ravaged region. The group left Wednesday morning from Harmar in a caravan of three SUVs packed with computers, transmitters, receivers and other, highly specialized communications equipment. Also on board: enough food and water to last for as many as three weeks. Among the group are Pittsburgh residents Richard Johnson, AE3C, who organized the trip, and Dave Kleber, KB3FXI. "Several other Skyview members donated equipment for the trip," Johnson said. "Amateur radio operators are doing much of the communicating in the area devastated by Hurricane Katrina because widespread power loss has made it impossible to relay information in more conventional ways," Johnson said.

***Cincinnati Enquirer*, Cincinnati, OH:**

"Ham Radio Gets Renewed Respect." "It's like the feeling you get from living in a world of black tuxedos and you are a pair of brown shoes. You may look nice, feel shined up and ready to go—but you just don't fit in to what's happening. You get no respect," said Joe Phillips, K8QOE, of Fairfield. "It took an American disaster, and now we are featured in the *Wall Street Journal* and *New York Times*. National TV mentions us regularly. As a lifelong amateur radio operator, I'm tired of constantly being told my hobby was no longer useful due to computers, the Internet and cell phones. Old fashioned and useless, was the line. Then Katrina happened. Suddenly the 'brown shoes' of our American culture became the only communications vehicle that worked in New Orleans. It took a major crisis for ham radio's continued usefulness to break through to average Americans. It showed them that the fancy techno toys always need a simple practical backup, no matter how advanced these toys become. And it demonstrated how valuable ham radio operators continue to be to our country, no matter how old-fashioned we look."

This is just a sampling of reports from the media on the importance of ham radio communications in times of emergency, such as Hurricane Katrina. As K8QOE was just quoted above, " . . . it demonstrated how valuable ham radio operators continue to be to our country, no matter how old-fashioned we look."

73, Fred, W5YI



digital connection

BY DON ROTOLO,* N2IRZ

Katrina Response and Regulation by Bandwidth: How the Two are Closely Related

As I write this, the sting of Hurricane Katrina is still in everyone's eyes and Rita has just fizzled into a tropical storm. Folks down south certainly got their share of emergency communications practice, and almost everyone noticed that amateur radio once again proved useful—but perhaps not as useful as in the past. Oh sure, we delivered zillions of tactical, strategic, and health-and-welfare messages, sometimes on amateur frequencies and sometimes on military; a communicator doesn't really care which band, just that the job gets done. However, with expectations higher than ever before, some agencies were looking for something more from amateurs, something we're not yet able to deliver.

HF Bandwidth

Before we get into that, I want to mention the ARRL's Regulation by Bandwidth proposal. For HF frequencies below 29 MHz, a flat bandwidth maximum of 3.5 kHz is proposed (with an exception for AM), raising quite a ruckus in the digital community. You see, with a bandwidth limitation like that higher data rates become impossible, since (according to Shannon's theory) for a given bandwidth there is an upper limit on the data rate.

That means if the ARRL proposal is accepted as is, data rates somewhat less than 3.5 kb/s will be the fastest anyone can even consider on frequencies below 29 MHz. Wideband modes, such as OFDM, will become illegal unless they are limited to a relatively narrow bandwidth, kind of defeating the purpose. On the bands with the best propagation potential, especially for widespread events such as Katrina, we will be unable to send data any faster than a relative snail's pace. I have heard the phrase "shooting ourselves in the foot" mentioned a few times.

Considering the service that the emergency response community wants and needs, which is a relatively fast data channel that can span one to three hundred miles, such a narrow bandwidth simply does not meet the need. It is important to note that there is currently no real limit on bandwidth, only on data rate, so amateurs have been experimenting with using additional bandwidth to improve the robustness of the communications. The leap to higher speeds is an easy one.

HF Propagation

First let's consider the HF bands. These are our utility frequencies, where we get a lot of the "work" of amateur radio done. While there is a lot more space available at VHF and above, these bands are less useful for long-range communications due to their generally short-range propagation characteristics. For example, a path from New Orleans to Houston on, say, 2 meters would be difficult under most conditions. Even 6 meters would be a stretch most times, but using 40 meters NVIS would be a snap. (NVIS is Near Vertical Incidence Skywave, essentially transmitting almost straight up and reflecting the signal only one to three hundred miles out, a range normally not possible with the usual low angle of radiation used for most HF work.) If 40 meters is no good that day, then 20 or 80 is likely to be working. The value of HF also lies in the broad diversity of propagation characteristics available across the bands.

Of course, going out much farther—such as 500 to 1000 miles or more—is what we do every day, so again the HF bands are where we need to be.

Speed

Now let's talk about speed. It's a bit slippery to define just how fast "fast" is, but over the course of some collaborative discussions among HF, digital, and emergency communications folks, we came to a good idea of where we have to be. Some participants didn't understand the need to define the bandwidth requirements in terms of a data rate, and others didn't understand the need to define anything at all. I can't count the number of times I was told, "Why not just define the band edges and make it a free-for-all?" or that "3.5 kHz is not enough, we need more," but without any definition or statement of what "more" is. Others stated, "We need 100 kHz bandwidth," but when challenged were unable to state just what they would do with that bandwidth, or explain how they arrived at that figure. In other words, getting a very diverse team to really think about what the needs are was not a simple task.

Having a clear, lucid, and convincing argument for a certain bandwidth is important. Although the ARRL had stated that it has developed its final proposal, the FCC still has to adopt it. Within that adoption process lies the ability for everyone to offer their opinions on the proposal to the FCC decision makers. A good rational argument against (or for) some aspect of the proposal has a better chance of being considered and incorporated into any eventual Notice of Proposed Rule Making and/or Report and Order than a thousand vague complaint letters.

Communications Requirements

As it turns out, the needs for information movement services are nearly as diverse (meaning

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hard to define) as the people using our services. However, it was generally accepted that emergency responders would need to send about two pages of text in a minute, or a smaller (50 kB) image in less than 2 minutes, which I characterize as 4 to 5 kilobits per second. These figures are based on actual needs expressed during the Katrina response and were developed by broad consensus rather than the statement of just a few. Now that we have a reasonable figure for throughput requirements, we need to consider conditions.

While high throughput under perfect band conditions is easily accomplished, here we need to consider more realistic conditions. What we came up with was that we absolutely require 100% perfect copy so that things such as e-mail headers and files would not be corrupted, while dealing with signal levels that are essentially in the noise (or, more accurately stated, noise levels so high they impact the signal). The perfect copy requirement isn't needed for casual tactical communications; a missed character here or there doesn't impact the understandability of the message much, but files and e-mail routing data are more sensitive to errors.

Error Rates

We can express this requirement as a certain Bit Error Rate (BER), or the number of bad bits as a fraction of the number of bits received. Note that the *true* end-to-end BER is measured after the application of any error correction, while the *raw* BER is the error rate of the channel itself. We find that a true BER of 1 in 10^5 (one bit in 100,000, usually expressed at 10^{-5}) is the minimum acceptable error rate. This is much worse than we usually encounter on, say, a phone line or Ethernet network, but a reasonable minimum for our purposes. Some have argued for a true BER of 10^{-6} instead.

A 10^{-5} or 10^{-6} BER is easily and routinely accomplished on VHF packet, for example, but on HF (where noise can be significant) we need to consider the maximum noise levels (relative to the carrier) under which we can maintain the required BER. In this case, a lower number means greater resistance to noise. When the signal levels are +10 dBc (the carrier is 10 decibels above the noise), normal communications are easy—what we might call armchair copy. As the noise increases, or the signal level decreases, we eventually lose the ability to understand the signal. For our purposes, we need to maintain the stated BER even at signal levels 5 dB below the noise, or –5 dBc.

Error Correction

Yes, some digital modes can pull signals from below the noise. The raw BER might be high, but with error detection and correction the required BER can be accomplished. However, any increases in robustness come at the price of data throughput. Digital enthusiasts speak of Forward Error Correction (FEC) schemes with 4/5 or 1/3 "code" rates; this means 4 (or 1) payload bits for every 5 (or 3) bits transmitted. While sending these extra bits reduces actual throughput, the advantages of being able to correct any errors at the far end outweigh the loss of data rate. The more redundant bits sent, the slower the actual throughput, but the greater the ability to correct errors. This ability behaves just like signal gain, and so is called "coding gain," which is just as real (and effective) as antenna gain and often more valuable when power is scarce.

The only way to maintain a real throughput of a certain value as you go to more and more robust FEC codes is to increase the "raw" data rate, the uncorrected data rate on the channel. The only way to increase the raw data rate is to increase the bandwidth of the signal.

We Need 25 kHz

If we have a bona-fide requirement to be able to send about 5000 bits per second, with a BER of 10^{-5}, at a signal level of –5 dBc, we conclude that a raw data rate of about 13,000 to 15,000 bits per second is the minimum acceptable data rate. While that might be a theoretical bandwidth of only 15 kHz, at the state of the art and at amateur power levels (100 watts), we arrive at a reasonable bandwidth requirement of around 25 kHz on the HF bands. A case can be made for a little more or a little less, but this is a good starting point, one with which few amateurs have a serious issue.

The case I made here for 25-kHz channels on HF is necessarily brief and does not show the considerations made of the many factors involved. If you want to discuss this further or learn more, just write. Also, before you fire off a flame-mail to me about how those PacTOR and other digital weenies are ruining the bands, note that I advocate restricting these kinds of communications to very specific locations on the bands, only where the size of the band can support them, and with the understanding that the routine users would probably have to go QRT in

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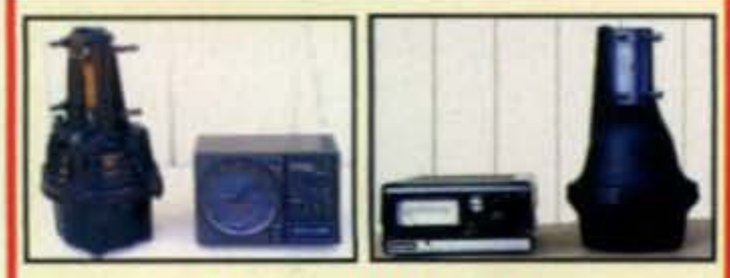

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an emergency. We can't have any one group hogging the limited bandwidth we have available; instead we have to figure out a way in which we all can share and get along with one another. I'm confident we can make it work.

What We Couldn't Do

Okay, with that being said, let's return to the original premise of this month's column—the kinds of communications that the first responders wanted, but amateurs didn't and couldn't deliver. The first example is what we discussed above: a reliable data channel for moving strategic data over medium distances. For example, it would have been excellent if we could have collected the personal data of each person as they boarded the bus from the New Orleans Superdome and had a photo ID ready for them when they got off the bus at the Houston Astrodome. That kind of info, if it were compiled in a central database, would simplify the process of reuniting dispersed families, rerouting snail mail, and so much more. Requests for materiel could be sent electronically, instead of by satellite phone or voice, automating fulfillment and reducing errors. However, all of this depends on a fast, reliable data channel out of the stricken area, for which not even a satellite phone is very good.

HF is the best medium for such a pipeline, but with a bandwidth limitation of 3.5 kHz those bands become useless for this purpose, and I am unaware of any alternatives we can consider.

Local Wireless LANs

Once that basic robust pipeline (or a few of them) is established, we then need a way for many people to access it. The obvious and simple solution is wireless laptops accessing a temporary 802.11-based LAN. FEMA and other agencies have and use laptops for most everything, and having an 802.11 LAN would have been quite convenient. There were a few inquiries to hams as to whether such a LAN could be deployed, but the equipment and planning were just not available.

Hams are certainly qualified to put up wireless access points and join them together with backbones (on some other band, such as 802.11a, 802.16, or 900 MHz), creating an entire wireless blanket over areas in need. The network would not only feed the pipeline out of the area, it would support communications within the area. Had we been able to do this, imagine the positive reactions of our customers—the various groups and agencies looking for tactical communications support.

While the resources may not be available in the amateur community (all this costs money), hams should be designing rapid-deployment networks that some agency such as the Red Cross can go out and buy for the next emergency. The last column I wrote explained the elements of good RF network design, and last April I reported on the SkyPilot system, something that could serve as a model for a such a temporary network.

A Paper for the DCC?

Has anybody already done this design work? A paper explaining exactly what equipment to use, how to configure and deploy it, RF and power considerations . . . now that would be something valuable, *A Field Guide to Wireless LANs and MANs*. Hams are well-qualified to develop something like this, and this is one area in which we can really prove our worth.

A Decade Already?

Moving on, it was somewhat startling to me to discover that this column marks the end of my tenth year of writing for CQ Communications. I started with the second issue of the old monthly version of *CQ VHF* back in 1996 and have been writing a column every month or two since then. What amazes me is that I have covered a different aspect of digital communications virtually every time, and the list of ideas never seems to get smaller. The real world remains firmly analog, but digital continues to shape our world.

So another year comes to a close, and as I have for the last ten years, I will close my December column with my sincere wishes to each and every one of you for peace in our world, along with my hopes for happiness, health, and prosperity in the new year.

73, Don, N2IRZ

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BY KARL T. THURBER, JR.,* W8FX

'Tis the Season!

'Tis the season, indeed! In this twelfth month of the year, we again shine *CQ*'s product spotlight on radio shack accessories, antennas and antenna accessories, portable and mobile goodies, software, new books, and more—including some "stocking stuffers" we think will be of special interest to you in this holiday season. Let's dig right into the goodies.

Accessories for the Radio Shack

Super PWRgate PG40S from West Mountain Radio. New from West Mountain Radio is the Super PWRgate PG40S Backup Power System (see photo A), a simple power backup device with a built-in fast-charging circuit. Its features combine to make for a true solid-state uninterruptable power source (UPS) designed specifically for ham shack or repeater installation.

The Super PWRgate delivers up to 40 amperes continuously at 12 volts. It connects both your battery and power supply to your station while isolating both from each other. It's designed so that whenever you have AC power, your power supply feeds your station, and whenever you lose AC power, the Super PWRgate instantly, and without a glitch, switches over to battery power.

The built-in, four-state charging circuit charges your battery quickly with a selectable rate of 1, 4, 7, or 10 amperes. Unlike standard lead-acid battery chargers, there is no RF switching noise or hum to contend with, because the PWRgate uses your station's "clean" power supply.

The charger is optimized for gel-cell and AGM (absorbed glass mat) sealed lead-acid batteries, but it will also safely charge flooded lead-acid, automotive, and marine batteries. The charger provides maximum life from your battery with the proper charging technique, keeping your battery happy and ready to go.

The Super PWRgate connects with the Amateur Radio Emergency Service (ARES) and Radio Amateur Civil Emergency Service (RACES) standard DC connectors, Anderson Powerpoles®. This flexibility provides a quick and simple plug-in installation to make your station ready for the next emergency. The Model PG40S is $119.95.

For more information, or to place an order, contact West Mountain Radio, 18 Sheehan Avenue, Norwalk, CT 06854 (203-8538080; e-mail: <sales @westmountainradio.com>; on the web: <http:// www.westmountainradio.com>).

Photo A– New from West Mountain Radio is the Super PWRgate PG40S Backup Power System. Its features combine to make a true solid-state UPS designed specifically for the ham shack or repeater. (Photo courtesy of West Mountain Radio)

Antennas and Accessories

MFJ-1625 and MFJ-1623 Window/Balcony Antenna with Built-in Tuner. The new MFJ-1625, 80 through 6-meter Window/Balcony Antenna with built-in Tuner (photo B) is said to be a truly complete antenna system. It mounts on window frames, balconies, and railings, and thus is recommended for apartment dwellers.

The new antenna package includes a universal mount/clamp, built-in antenna tuner with RF isolator, long (12 ft.) telescoping whip (22.5 in. when collapsed), high-efficiency loading coil for 40/80

Photo B– MFJ Enterprises offers the new MFJ-1625, 80–6 meter Window/Balcony Antenna with built-in Tuner. It's a complete antenna system that mounts on window frames, balconies, and railings—perfect for apartment dwellers. (Photo courtesy of MFJ)

*289 Poplar Drive, Millbrook, AL 35054-1674
e-mail: <w8fx@cq-amateur-radio.com>

Photo C– New from MFJ is the MFJ-907 Variable RF Transformer, which matches the low impedance of popular mobile antennas to your 50-ohm transceiver. (Photo courtesy of MFJ)

Photo E– The MFJ-909 Mobile Antenna C-Matcher matches HF mobile antennas over the range 10–80 meters by adding C (capacitance) from the feedpoint to ground. (Photo courtesy of MFJ)

meters, counterpoise wires, and a safety rope. The MFJ-1625 handles 200 watts and is priced at $199.95. Also available is the MFJ-1623, at $179.95. It's like the MFJ-1625, but it covers 6 through 30 meters.

Both antenna products are protected by MFJ's famous No Matter What™ one-year limited warranty. Under the warranty, MFJ will repair or replace (at their option) your MFJ products no matter what for one complete year.

To place an order, obtain a free catalog, or find the name of your nearest MFJ dealer, contact MFJ Enterprises, Inc., 300 Industrial Park Rd., Starkville, MS 39759 (1-800-647-1800; e-mail: <mfj@mfjenterprises.com>; on the web: <http://www.mfjenterprises.com>).

Portable and Mobile Goodies

A Mobile Trio from MFJ Enterprises. We aren't finished with MFJ just yet, gang. Especially for mobileers, there are three small-profile, "must-have" accessories from MFJ that might just make good stocking stuffers.

First up is the MFJ-907 Variable RF Transformer, at $59.95 (photo C). It's a multi-tap transformer that matches a variety of popular low-impedance (2–50 ohm) HF mobile antennas to your 50-ohm transceiver. The transformer offers 11 impedance ratios, and it may be used in reverse to transform high impedances to 50 ohms. The MFJ-907 handles 1000 watts over 1.8 to 30 MHz, and standard SO-239 connectors are furnished.

Next up is the MFJ-908 Mobile Antenna L-Matcher (photo D). The MFJ-908 matches a variety of popular HF mobile antennas over the range 10–80 meters by adding L (inductance) from the feedpoint to ground, in the form of an L-network with the antenna. The unit has 11 values of switchable inductance. It handles 200 watts, has SO-239 connectors, and is $39.95.

Finally, there's the new MFJ-909 Mobile Antenna C-Matcher (photo E), at $39.95. The MFJ-909 matches popular HF mobile antennas over the range 10–80 meters by adding C (capacitance) from the feedpoint to ground, forming an L-network with the antenna. It also offers 11 values of switchable capacitance. The unit handles 600 watts and is furnished with SO-239 connectors.

All three products are protected by MFJ's famous No Matter What™ one-year limited warranty. For more information, get in touch with MFJ Enterprises, Inc. at the contact information given above.

Photo D– The MFJ-908 Mobile Antenna L-Matcher matches HF mobile antennas over the range 10–80 meters by adding L (inductance) from the feedpoint to ground. (Photo courtesy of MFJ)

Software and Computers

An Antenna Modeler's Kit from antenneX. If you're thinking about joining the many others who are now enjoying the benefits of antenna modeling for fun or profit, now is the time with the advent of the Antenna Modeler's Kit from antenneX. Here is a special opportunity to obtain some of the best modeling tools available, all packed into a single kit.

The Antenna Modeler's Kit, which is for beginners and the advanced amateur alike, includes just about everything you need to learn or expand your knowledge of this fast-growing technology: sophisticated but user-friendly NEC software, 1200+ pages of how-to modeling books, and many hundreds of modeling files in the standard .NEC/.EZ/.NWP formats. The NEC software was developed in cooperation with respected antenna authority LB Cebik, W4RNL. The modeling files come from LB's own collection, and the accompanying books in the kit are authored by LB and published by antenneX.

The Antenna Modeler's Kit is available at a special price of $179.95. According to Jack L. Stone, the 1988 founder of antenneX, this special price represents a savings of $91.90, a 33-percent discount over the $271.85 regular price of the components purchased separately.

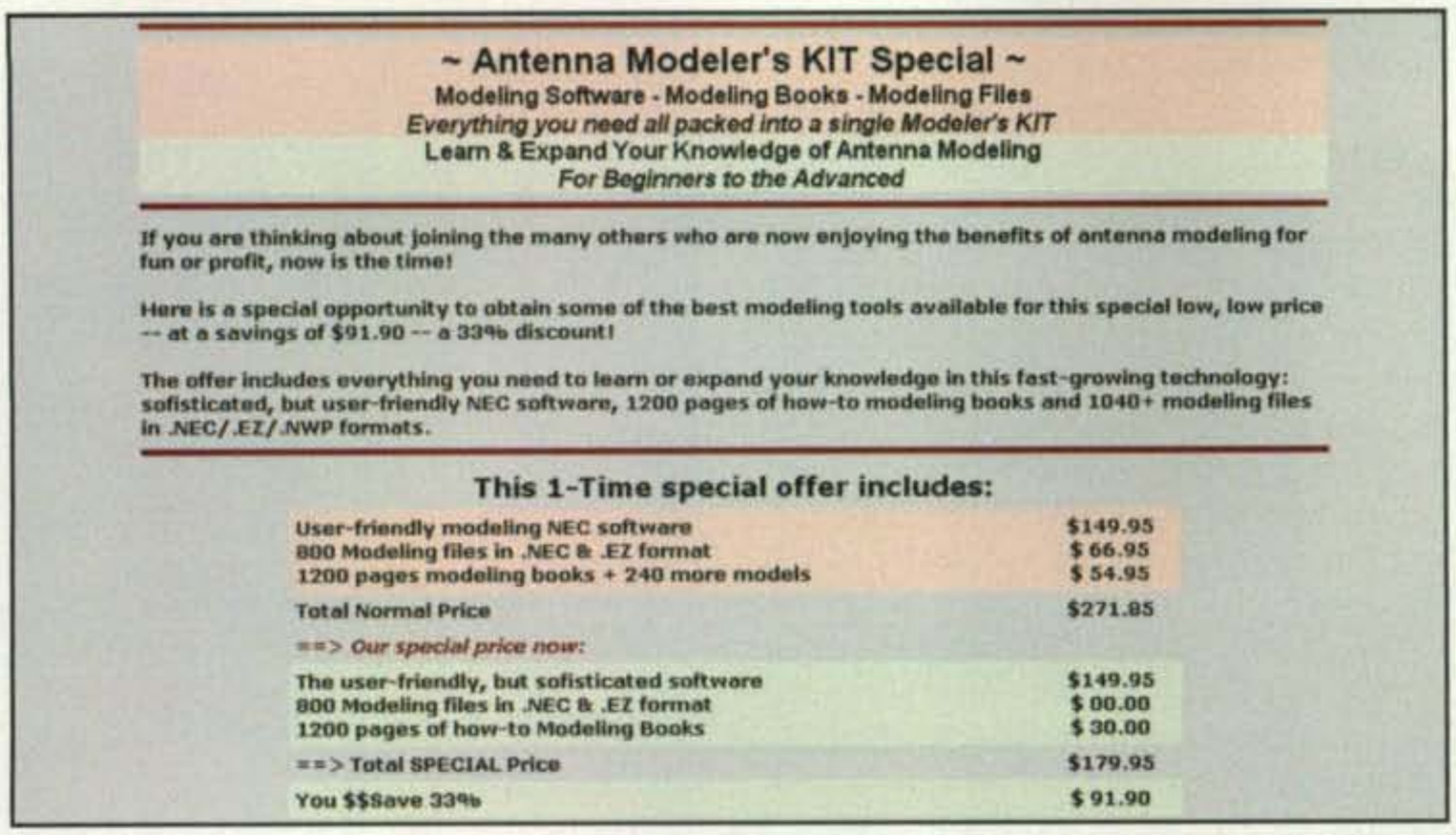

Fig. 1– Go to the Antenna Modeler's Kit announcement web page at <http://www.antennex.com/news/announcements3.htm> for more on the special package. The software, books, and modeling files are available there for immediate download. (Graphic from the Antennex website)

For more information or to order, contact antenneX Online Magazine, P.O. Box 271229, Corpus Christi, TX 78427-1229 (1-888-855-9098; e-mail: <info@antennex.com>; on the web: <http://www.antennex.com>). Be sure to check out the antenneX website, which is replete with e-books, CD-ROM collections, antenna articles, software, modeling files, and other authoritative antenna information.

Special note: Go to the Antenna Modeler's Kit announcement web page at <http://www.antennex.com/news/announcements3.htm> for more details on the special package (see fig. 1). The software, books, and modeling files are available there for immediate download. While the several files to download total more than 23 MB, they are broken down into manageable chunks for your convenience.

DXpedition and Contest Videos by 9V1YC. James Brooks, 9V1YC, and Charlie Hansen, NØTT, offer an expanding line of DXpedition and contest videos. With the DVD or VHS videos, you can experience the pile-ups and overall excitement from some of the most remote corners of the world.

Professionally produced, broadcast-quality documentaries from some of amateur radio's most exciting events are available on DVD and VHS (fig. 2). See what it's like behind the scenes at some of the most famous DXpeditions in the

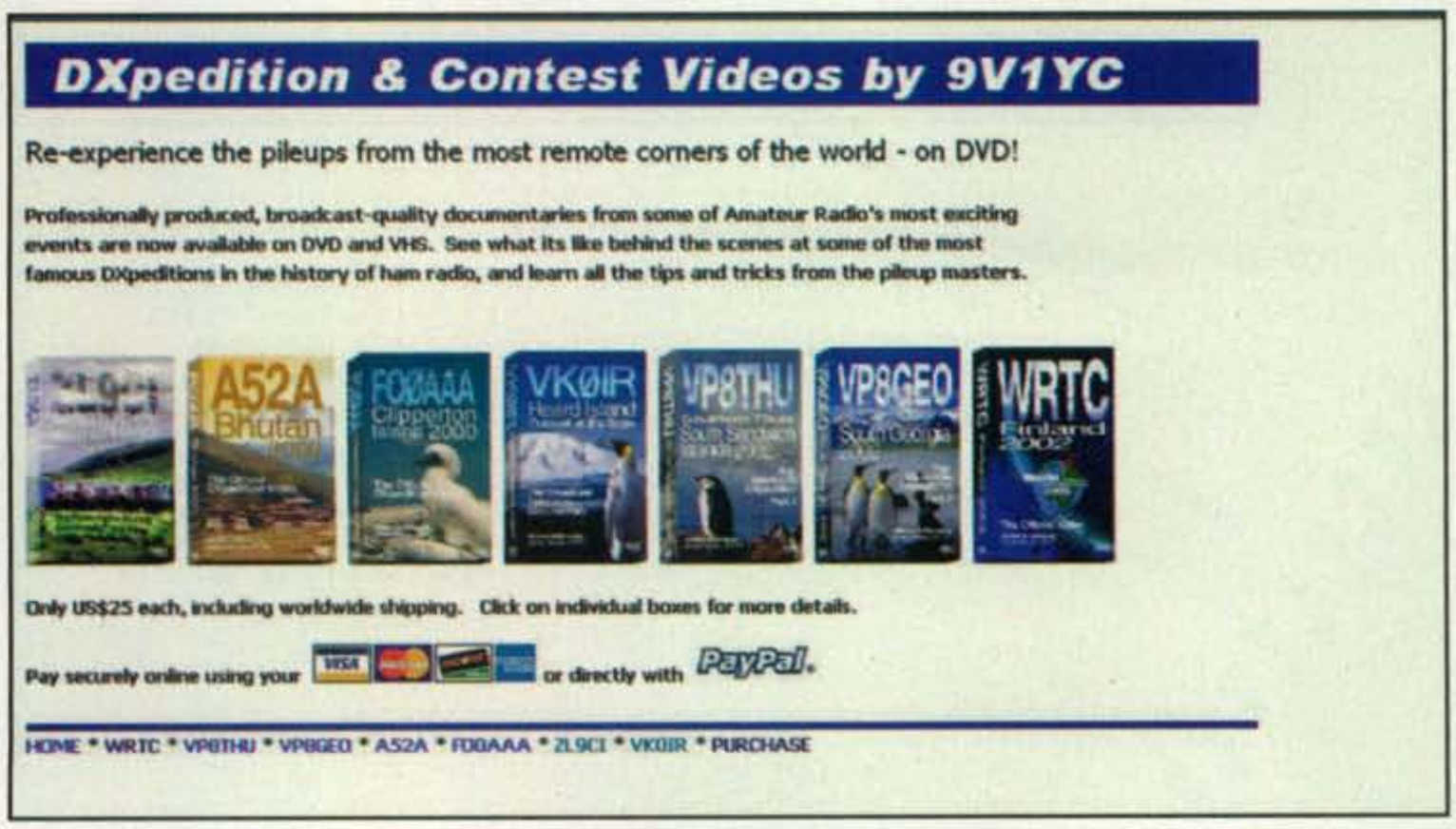

Fig. 2– James Brooks, 9V1YC, and Charlie Hansen, NØTT, offer professionally produced, broadcast-quality DXpedition and contest documentaries on DVD and VHS tape from some of amateur radio's most exciting events. See text for details. (Graphic from the 9V1YC DX Videos website)

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history of ham radio, and learn all the tips and tricks from the pile-up masters.

Presently, videos are available for ZL9CI, Campbell Island, 1999; A52A, Bhutan, 2000; FOØAAA, Clipperton Island, 2000; VKØIR, Heard Island (a 1998 broadcast TV documentary); VP8THU, South Sandwich Islands, 2002; VP8GEO, South Georgia, 2002; and WRTC, Finland, 2002. A new 2005 video, FT5XO, Kerguelen, is being prepared and should be available shortly.

The DVDs and VHS tapes are attractively priced at $25 USD each, including worldwide shipping. You may pay securely online using your major credit card, or directly with PayPal®. All DVDs are multi-region encoded for 100% worldwide compatibility and are playable in all regions. Unless otherwise specified at the time of purchase, VHS format (PAL or NTSC) will be determined based on shipping destination.

For more information, contact Charlie Hansen, NØTT, 8655 Hwy. D, Napoleon, MO 64074 (816-690-7535; e-mail: <n0tt@juno.com>; on the web: <http://www.dxvideos.com>).

From the Bookshelf

New from Nifty! Ham Accessories: VX-6R Quick Reference Card and Mini-manual. Proprietor Bernie Lafreniere, N6FN, let us know of yet another addition to his rapidly growing line of quick-reference guides. Bernie recently has added the Yaesu VX-6R Quick Reference Card and Mini-manual (photo F) to his growing series of quick-reference guides. According to Bernie, the company provides both a wallet-sized Quick Reference Card and one of its spiral-bound mini-manuals as a complete package for the VX-6R.

The tri-folded, wallet-size card is said to be ideal for those spur-of-the-moment situations when you need to program a repeater frequency and perform DTMF dialing, scanning, or other basic operations. The accompanying spiral-bound mini-manual provides complete coverage of the VX-6R's many features in a compact 20-page, 4.5" × 8" inch format.

These short-form guides are organized for quick access to simplified, step-by-step instructions for programming and for operating the radio's many features. All controls and setup menus are fully described. Thus, both guides are convenient memory joggers for instantly recalling how to set up and operate your radio. Printed in color and laminated for durability, the guides are designed as a ready reference to be kept with the radio so they are there when you need them.

Bernie tells *CQ* that this is the first time he has provided a tri-folded, wallet-size guide along with the mini-manual. Wallet-size guides, he reminds us, are ideal quick references for basic HT operations. They are convenient for carrying in a wallet or purse, being readily available when the need for reprogramming arises, while the accompanying mini-manual provides more extensive coverage of the VX-6R's many features.

The combination of the VX-6R Quick Reference Card and the spiral-bound Mini-manual is priced at $20.85 plus shipping and handling. For more information, or to place an order, contact Nifty! Ham Accessories, 1601 Donalor Drive, Escondido, CA 92027; (phone 760-781-5522; e-mail: <bernie-n6fn@niftyaccessories.com>; on the web: <http://www.niftyaccessories.com>).

ARRL Books for a Variety of Interests. The American Radio Relay League (ARRL) offers a wide selection of amateur radio books that you can peruse and order online. R. Dean Straw, N6BV, is a Senior Assistant Technical Editor at the ARRL, and as such is the editor of *The ARRL Antenna Book* and *ON4UN's Low-Band DXing* opus; Dean also is co-editor of the popular *Simple and Fun Antennas for Hams*. Most readers are well aware of

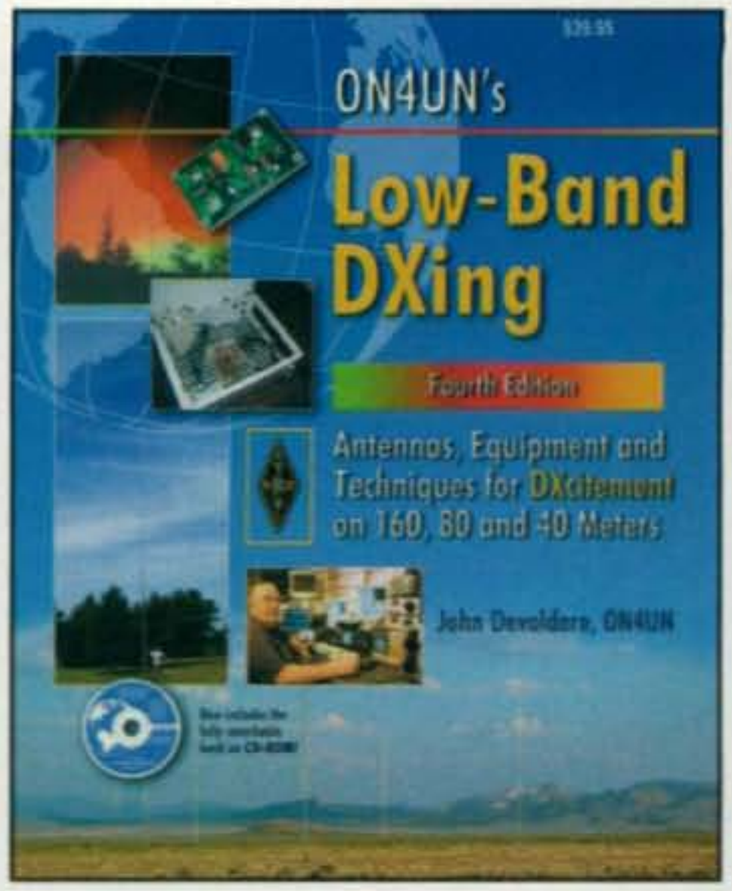

Fig. 3– The ARRL's recently revised ON4UN's Low-Band DXing *offers up antennas, equipment, and techniques for "DXcitement" on 160, 80, and 40 meters. John Devoldere's fourth edition includes antenna designs, operating guidelines, and an insider's scoop on low-band DXing. (Graphic courtesy of the ARRL)*

the quality of the current, 20th edition of *The ARRL Antenna Book*, but for now we would like to bring your attention to the latter two books.

First up is *ON4UN's Low-Band DXing*, Fourth Edition (fig. 3). The newly revised book offers up antennas, equip-

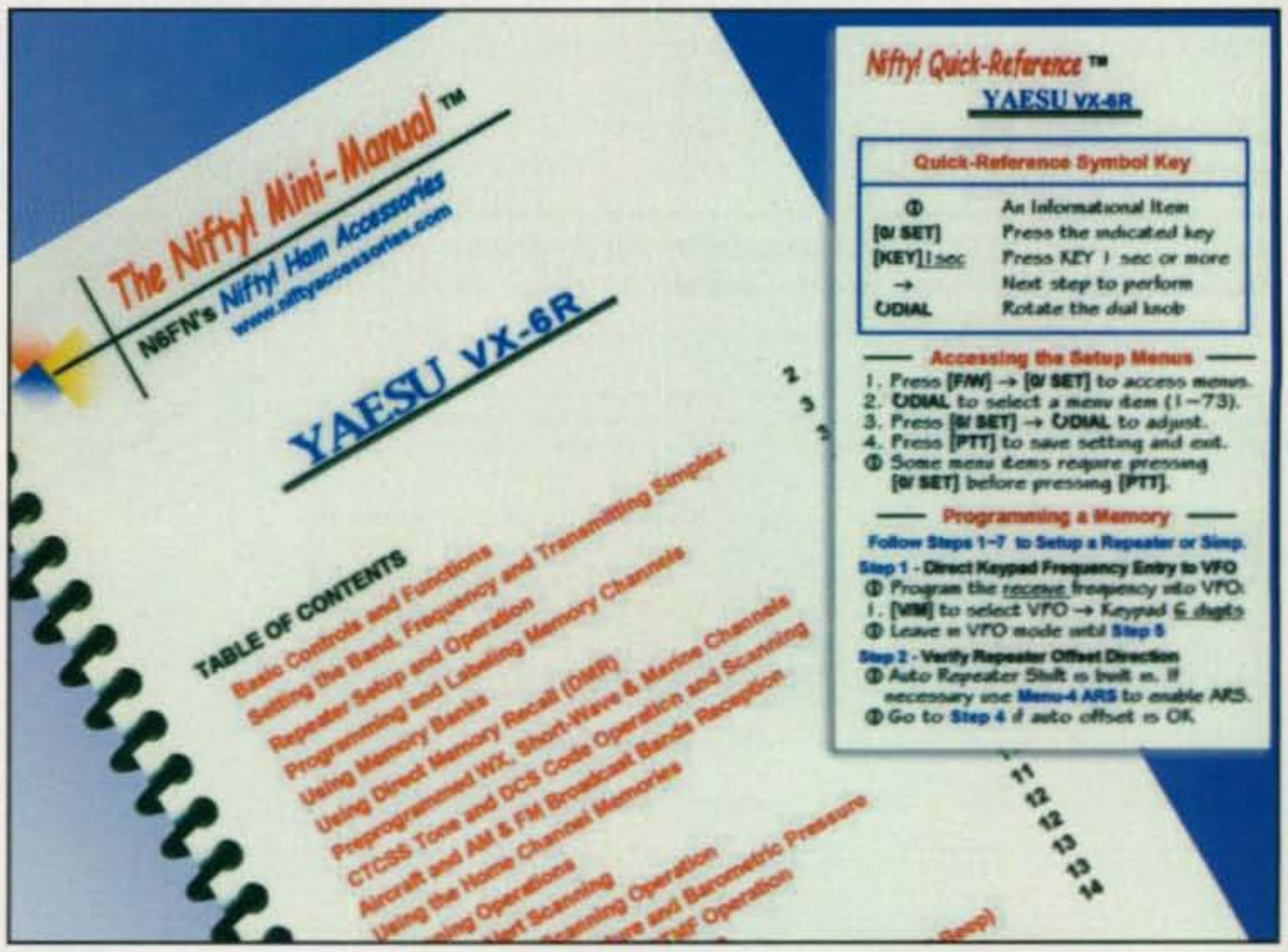

Photo F– Nifty! Ham Accessories has added the Yaesu VX-6R Quick Reference Card and Mini-manual to its line of quick-reference guides. It's the first time the firm has provided both a wallet-size Quick Reference Card and a spiral bound Mini-manual as a complete package. (Photo courtesy of Nifty! Ham Accessories)

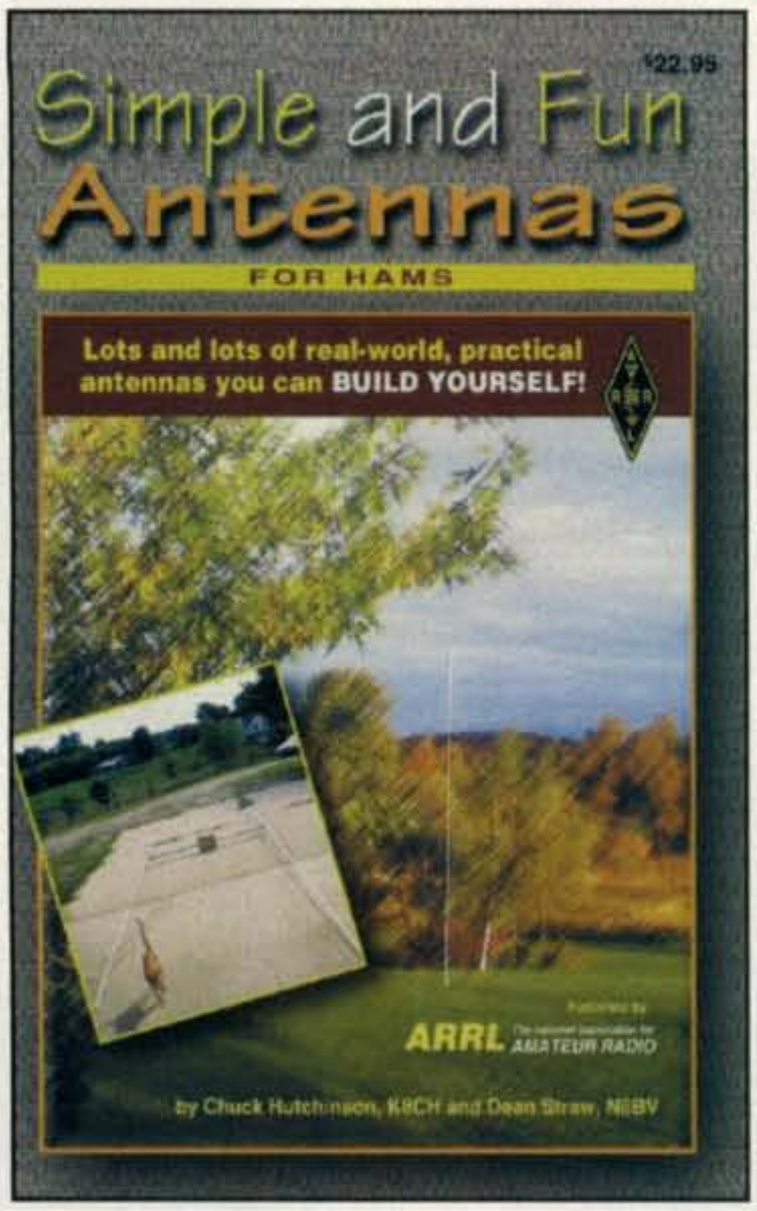

Fig. 4– The ARRL's newly reprinted Simple and Fun Antennas for Hams *is co-authored by Chuck Hutchinson, K8CH, and Dean Straw, N6BV. The book is widely considered to be a no-nonsense, hands-on, practical book about antennas. Check it out. (Graphic courtesy of the ARRL)*

ment, and techniques for "DXcitement" on 160, 80, and 40 meters, being authored by low-band expert John Devoldere, ON4UN. The new edition includes antenna designs, operating guidelines, and an insider's scoop on low-band DXing. The bottom line is that there's something in the book for every active low-band operator, contester, and DX chaser.

The new edition is thoroughly updated with entirely new material on low-band antennas and high-gain transmitting arrays. Included are new insights and new design techniques for receiving antennas and vertical arrays.

According to Dean, book author ON4UN is one of the most recognizable figures on the DX scene. He spent more than 1500 hours rewriting and updating his *ON4UN's Low-Band DXing,* known far and wide as the "low-bander's bible." The new edition is bundled with the fully searchable and complete book on CD-ROM for Windows® and Macintosh® systems. The package also contains additional ON4UN software and over 2000 quality photographs. The fourth edition with CD-ROM is $39.95 plus shipping and handling.

Also available from the ARRL is the newly reprinted *Simple and Fun Antennas for Hams* (fig. 4), by Chuck Hutchinson, K8CH, and Dean Straw, N6BV. The popular book, which Dean tongue-in-cheek refers to as our "Little Antenna Book, with Attitude," includes lots of real-world, practical antennas that you can build yourself. As a result, it's billed as a no-nonsense, hands-on, practical book about antennas.

The chapter titles of the book give us a good idea of the book's down-to-earth contents. They include Your First VHF Antenna; Your First HF Antenna; Facts About Transmission Lines; Antenna Masts and Supports; HF Verticals; More Simple and Fun Antennas for VHF and UHF; More HF Dipoles; Dual-Band VHF/UHF Antennas; An HF Vertical That Needs No Radials—Try the HVD; Yet More HF Dipoles; More Facts About Feed Lines; A Potpourri of Antenna Ideas; VHF Beam Antennas; Towers; HF Beam Antennas; and Getting the Most Out of Your Antenna. The $22.95 book is now in its second (2005) printing.

Contact the American Radio Relay League, 225 Main Street, Newington, CT 06111-1494 (1-888-277-5289; e-mail: <pubsales@arrl.org>; on the web: <http://www.arrl.org/shop>). Orders may be placed online, and the paper ARRL Publications Catalog is available upon request.

Wrap-Up

That's all for this time, gang. Next time, more "What's New." See you then.

Overheard: At this holiday season, perhaps we should remember one of the oldest of sayings: It truly is more blessed to give than to receive. Amen!

73, Karl, W8FX

***Note:** Listings in "What's New" are not product reviews and do not constitute a product endorsement by CQ or the column editor. Information in this column is primarily provided by manufacturers/vendors and has not necessarily been independently verified. The purpose of this column is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

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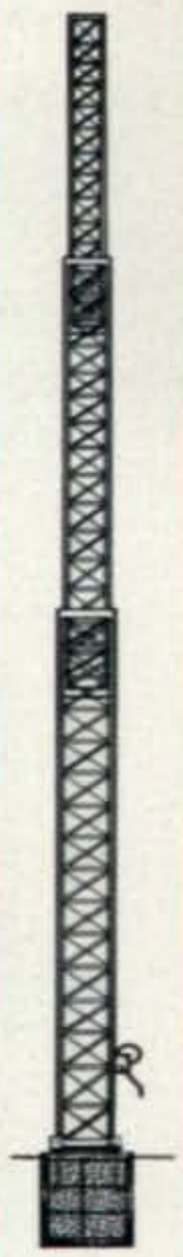

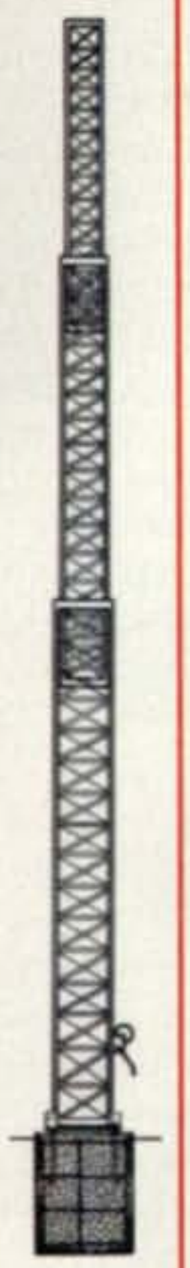

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TX-472MDP	72'	22'8"	1210	$5,571	$5,049
TX-489MDPL	89'	23'4"	1800	$9,034	$8,239

HDX SERIES HEAVY DUTY CRANK-UP TOWERS

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HDX-555	55'	22'	870	$3,162	$2,889
HDX-572MDPL	72'	22'8"	1600	$8,281	$7,549
HDX-589MDPL	89'	23'8"	2440	$10,841	$9,899
HDX-689MDPL	89'	23'8"	3450	$20,943	$19,129
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• Handles up to 22 square feet of antenna load. (See chart below)

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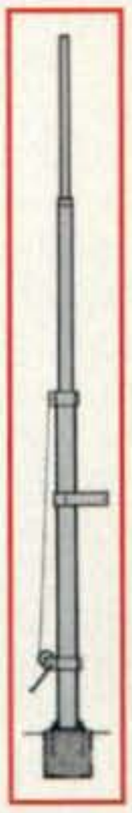

TMM SERIES COMPACT CRANK-UP TOWERS

• Handles 20 square feet of antenna load at 50 MPH, 8 square feet at 70 MPH.

• Compact design is great for areas with tower restrictions, or where a less intrusive installation is desirable.

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• Options include coax arms, raising fixtures, motor drives, thrust bearing, remote control panel, and more!

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MA-550	55'	22'1"	435	22	9	$1,875	$1,699
MA-550MDP	55'	22'1"	620	22	9	$3,584	$3,249
MA-770	71'	22'10"	645	15.5	5.5	$3,091	$2,799
MA-770MDP	71'	22'10"	830	15.5	5.5	$4,890	$4,449
MA-850MDP	85'	23'6"	1128	15.3	6.3	$6,591	$5,999

TMM SERIES COMPACT CRANK-UP TOWERS

TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
TMM-433SS	33'	11'4"	315	$1,626	$1,479
TMM-433HD	33'	11'4"	400	$1,970	$1,789
TMM-541SS	41'	12'	430	$2,135	$1,939

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BY DAVE INGRAM,* K4TWJ

Holiday Treats for Hams

Season's greetings, friends! We hope the holidays find you in good health, enjoying life, and amidst a giant ham shack filled with terrific gear. Supporting those cheerful wishes, we again make our traditional December column diversion to highlight special gifts and goodies for radio amateurs. The main focus this year is accessories and extras—those always-appreciated toppings such as microphones, keys, and other fun items that make amateur radio life so delightful. Enjoy the tour and remember to order those items that appeal to you early, as supplies typically run low and delivery runs slow during the holiday rush.

Let's begin with a new super-sounding mic from the master of great audio, Bob Heil, K9EID.

Microphones and Keys

Nothing enhances your amateur radio enjoyment and on-the-air image more than a new top-of-the-line microphone. Heil Sound's just-announced PR-20, PR-30, and/or PR-40 do that in high style (photo 1). The new mics are especially designed for professional-broadcast and recording-studio applications, so they are naturally hot candidates for radio amateurs striving to attain that much-desired million-dollar sound.

Heil's new PR-series mics feature a unique type of dynamic element that delivers outstanding frequency response with low distortion, low noise, and minimum rear/out-of-phase pickup for true broadcast-grade performance. The mics' optional shock mounts are icing on the cake, with an overall appearance comparable to their sound quality. Since these PRs are commercial items, they are fitted with a three-pin XLR-type connector and lack a PTT switch. Bob has that covered for hams, however, with optional "plug 'n play" cables for Kenwood, ICOM, and Yaesu transceivers. The cables include an in-line socket for a PTT plug or Stomp To Talk foot switch.

If you would like to be the first kid—err . . . ham—on your block on the bands with this new gem, contact Heil Sound at 5800 N. Illinois, Fairview Heights, IL 62208, telephone 618-257-3000, or on the web at <www.heilsound.com> and get cookin'!

Shifting into the new-key category, photo 2 introduces the classy P2 Iambic Paddle being produced in limited number by Jerry Pittenger, K8RA. The paddle sports a highly polished brass mechanism with lacquer coating to deter tarnish, silver contacts for long-run reliability, and clear fingerpieces. It has gap and tension adjustments for each lever and is supplied with a plastic dust cover/display case. The paddle is available in three versions: the smart-looking P1 with brass mechanism mounted on a lead-weighted oak wood base, a P2 with the same mechanism on a solid brass base, and a P3 with four pushbuttons for controlling/accessing a memory keyer included on its

Photo 1– Heil Sound's new PR-20, PR-30, and PR-40 series of top-of-the-line microphones (represented here by the PR-30 in its optional shock mount) are a radio amateur's dream come true. These professional broadcast and recording-studio mics look and sound totally awesome! (Photo courtesy of Bob Heil, K9EID)

Photo 2– Would you like to spiff up your life in the CW lane? Try this new P2 dual-lever paddle made in limited number by Jerry Pettenger, K8RA. It sports a highly polished brass mechanism with full adjustments, silver contacts, and plastic dust cover, and owners say it handles like a dream. (Photo courtesy of Jerry Pittenger, K8RA)

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e-mail: <k4twj@cq-amateur-radio.com>

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Photo 3– This eye-catching item from Morse Express is a ready-for-action miniature hand key complete with glamorous gold plating, oak wood knob, cable, and plug. It measures only 1.5 inches in length and makes an impressive "pocket key" for traveling. Key is available from N1FN of Morse Express. (Photo courtesy of Marshall Em, N1FN, Morse Express)

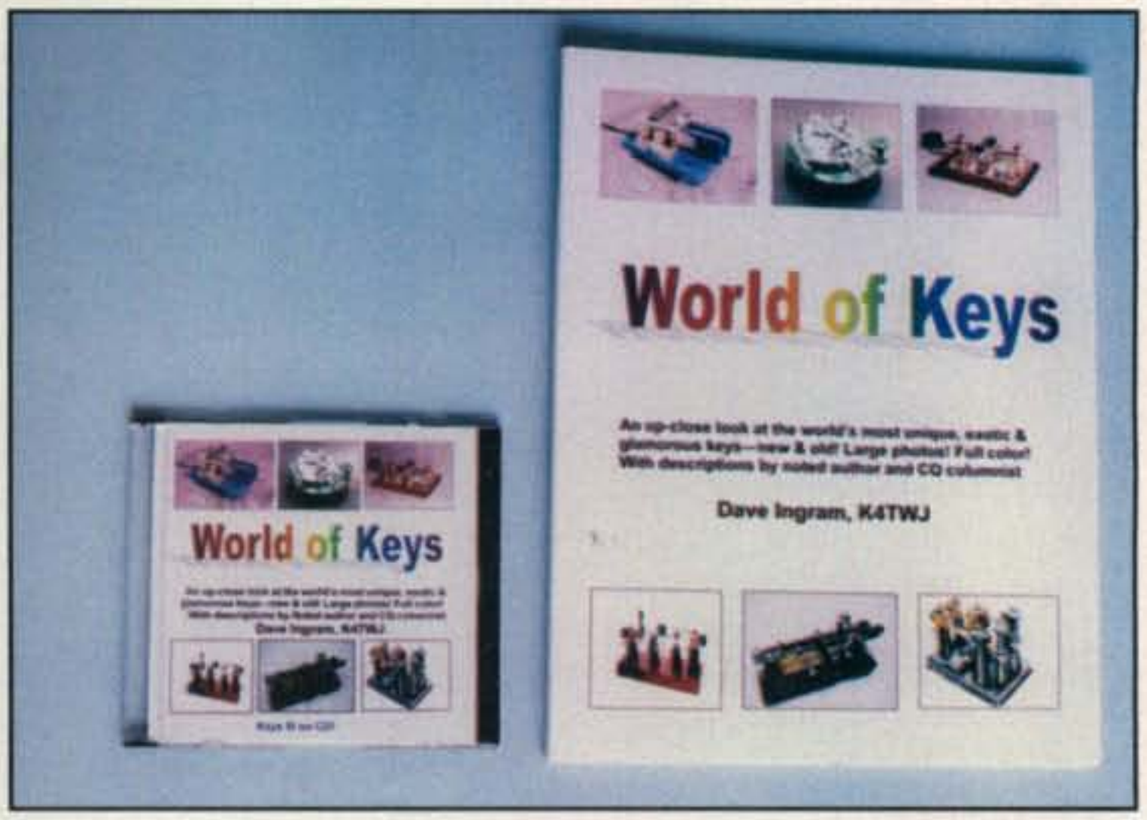

Photo 4– If you like CW and keys (need I even ask?), check out my new World of Keys *book and/or CD. Each one contains large, high-resolution photos, plus descriptions of keys, bugs, and paddles like few people have ever seen. Many photos are full color in the book; all photos are full color on the CD. The CD auto-starts and runs on your computer using your internet browser! Books and CDs are available direct from K4TWJ and select dealers nationwide. (Details in text.)*

brass base. Jerry makes each key by hand on a time-available basis, so there may be a waiting list. Check with him for more details at 6930 Cook Road, Powell, OH 43065, at 614-764-5872; via e-mail at <k8ra@arrl.net>; or <www.k8ra.com>.

Another telegraphy treat that is rapidly becoming an annual holiday favorite among CW enthusiasts is the trim little Christmas Key from Morse Express (photo 3). This year's model is a real ready-to-use miniature with 1.5-inch long base, both gap and tension adjustments, and cable with 3.5-mm plug. The limited edition key is brass with gold plating and an oak wood knob, and it is a fun-to-use showpiece—especially when operating portable. It—plus numerous other keys, bugs, and paddles of all types and price ranges— is available from Morse Express, 10691 E. Bethany Drive, Suite 800, Aurora, CO 80014, telephone toll-free 1-877dotdash, or on the web at <www.MorseX.com>.

If you truly enjoy CW and keys, incidentally, check out my new book and/or CD *The World of Keys* (photo 4). The book contains large, detailed photos in both black-and-white and color, while all photos on the CD are in full color. Over 100 of the world's most exotic and incredible keys are featured. There are spark keys, dual-polarity keys, wild version pump keys, far-out bugs, freaky bugs, Vibroplexes galore, miniatures, verticals, and much more in this, our third work on keys. The CD auto-starts and runs using your computer's internet browser. You can jump from chapter to chapter or just proceed key by key with mouse clicks, as desired. *The World of Keys book* is $18 plus $2.50 book rate postage or $3.85 Priority Mail, and *The World of Keys* CD is $16 plus $2.50 postage direct to you from me, K4TWJ, at 4100 S. Oates St., #906, Dothan, AL 36301 (or from select dealers nationwide). For a limited time both book and CD are available together for the special price of $28.50 plus $3.85 Priority Mail postage.

Super APRS

Looking for a really special gift to give (or receive!) this holiday season? Take a look at the new "no computer required" GPS/APRS combo shown in photo 5. This unique setup consists of a Kenwood TH-D7 2m/70cm FM handheld with built-in packet TNC (terminal node controller) and an AvMap GeoSat2 GPS preloaded with highly detailed maps of the entire U.S. and Canada. The two units are interconnected via a special NMEA data linking cable devised by Don Arnold, W6GPS. The GeoSat2 pinpoints your exact location (and direction of travel) on its 5.6-inch color screen while sharing that data with the TH-D7's TNC. In turn, the TH-D7 can beacon that information at 1-, 3-, 5-, 10-, or 30-minute intervals

Photo 5– GPS and APRS are increasing in popularity almost daily, and this new stand-alone setup is attracting quite a bit of attention. It consists of a Kenwood TH-D7 dual-band FM handheld with built-in packet TNC, AvMap, GeoSat2 GPS unit with highly detailed maps of the entire U.S. built in, plus a special interface cable devised by W6GPS. It is the perfect gift for any travel-oriented amateur! (Photo via Don Arnold, W6GPS)

Photo 6– Here is a neat treat you can enjoy during the holidays and for many years hence—the Hamfest Buddy. This quick-brew kit is a one-transistor/12-component QRP transmitter, wireless receive converter, personal emergency beacon, and micro transceiver all in one. The little rig is powered by a regular 9-volt battery; operates on 7.040, 10.108, or 14.060 MHz; and measures 1 ×1.5 inches. It goes together in about an hour and is an ideal first project for newer amateurs.

Photo 7– Universal Radio just added this new County Comm GP4L AM/FM/Shortwave radio to its line of attractive and affordable radios, and it is a terrific travel mate. It covers 6–10 and 11.6–17.9 MHz plus regular AM and FM bands, has a 12-hour clock with timer, uses two AA batteries, and is well-made and quite rugged. It is an ideal companion for my previously highlighted Hamfest Buddy. Universal has everything for hams and SWLs. Check it out!

on the national packet/APRS calling frequency of 144.390 MHz. Other APRS-equipped amateurs can then determine your location or follow your travel on their systems. As an alternative, you can track your own TH-D7 and GeoSat2 system from another APRS setup (or via the internet if a packet network link is established).

In addition to its street-level details of the full U.S., the GeoSat2 includes and displays over 4-million Points Of Interest (hotels, restaurants, gas stations, etc.) on its screen and can give you exact turn-by-turn directions from one place to another. It's a killer! Want a system or more details on one? Kenwood TH-D7s are available from dealers nationwide. Technical assistance on the GeoSat2 is available by e-mailing <donarnoldav@bellsouth.net>, and Geosat2 units are available from AvMap Navigation at 1-800-363-2627 or <www.avmapnavigation.com>.

Neat Treats

Would you like to quickly assemble a clever new item with multiple applications one evening during the holidays? Check out my own Hamfest Buddy kit (photo 6) as featured in the October issue of *CQ*. The kit is a combination QRP transmitter, wireless receive converter, personal emergency beacon, and two-frequency micro transceiver on a PC board measuring only 1 × 1.5 inches. It uses only a dozen parts and the location of each is well marked on the PC board, so it is the perfect "can't miss" project for newer amateurs.

"Buddy" kits are available for 40, 30, or 20 meters. They transmit a 60-mw CW signal and when a connected key is not in use, they radiate a wireless BFO signal to a low-cost AM-type shortwave receiver positioned a few inches away. The combo is ideal for monitoring (and joining!) QRP action at home or in/around motels at night after show hours of hamfests, and it also serves as a handy "keep in touch" aid with a mobile rig during brief pit stops while traveling. If a family member disappears from view and stops "blipping" with the Buddy, for example, jump to his or her rescue. You can also monitor for a "heads up" reply alert from the mobile rig by connecting a high-impedance earbud to the Buddy so it can receive CW from a nearby transceiver. (No AF amp, so it's like a shortwave crystal set with BFO).

The Buddy's (transmit and receive) range is around 500 feet without a dangling wire for an antenna. Several amateurs have connected their Buddys to an optional output filter and dipole, however, and transmitted to stations from New Mexico to Maine (and farther!) with it. They have also mounted their Buddys in everything from TicTac® boxes and key-chain pillboxes to Altoids® tins. Buddy kits are $18 including postage mailed directly to you (in U.S.) from me (Dave Ingram, 4100 S. Oates #906, Dothan, AL 36301). Specify if you want

Photo 8– Want to really impress shack visitors while reading output power with super accuracy? Add a new MFJ-878 giant SWR/wattmeter to your HF setup. It reads average or peak power in 20-, 200-, and 2000-watt ranges and sports a classic analog meter measuring 6.5 inches corner to corner.

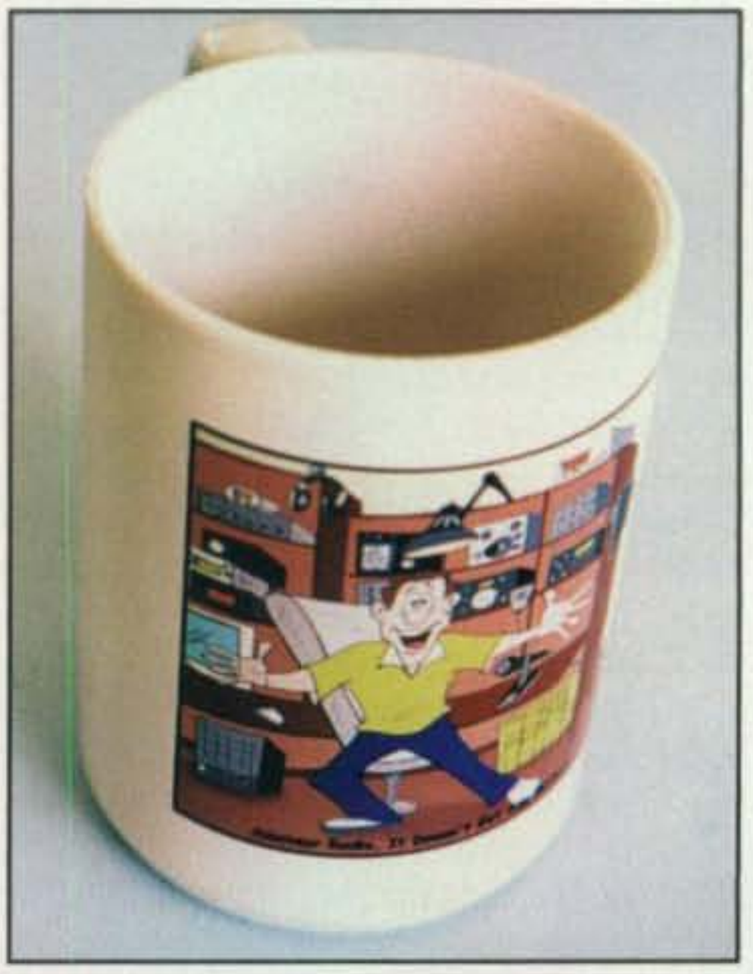

Photo 9– It doesn't tune antennas, receive shortwaves, or send CW, but it is a spot of morning cheer every radio amateur appreciates—a new ham cartoon coffee mug personalized with your call. Several different designs are available. Check them out and order a mug at <www.n4avm.com>.

Photo 10– Tops on every radio amateur's holiday want list for sure is a subscription to CQ, CQ VHF, *and/or* Popular Communications *magazine. It's the gift that keeps on giving throughout the year and it is comparable to a hamfest by mail.*

a 7.040, 10.108, or 14.060 crystal with your kit, and I will zip one back to you via mail.

Universal Radio is introducing several new items of interest this holiday season, and the one especially catching our attention (mainly because it is a perfect mate to our previously highlighted Hamfest Buddy) is the palm-size County Comm GP4L AM/FM/Shortwave receiver shown in photo 7. The receiver measures 3.5"H×2.5"W×.9"D and it tunes from 5.9–10.2 and 11.6–17.9 MHz (plus 530–1710 kHz/AM and 80–108 MHz FM). Its main purpose is receiving international shortwave broadcast stations, so it lacks a BFO for copying CW. Place a Hamfest Buddy beside it, however, and it becomes a hot little CW receiver—and a low-cost one! You can order a GP4L from Universal Radio at 1-800-431-3939 or <www.universal-radio.com>. Check out Universal's super line of ham gear, too. These folks have it all—with good prices and the best service imaginable!

Looking south, MFJ Enterprises also has some cool new items worthy of recognition—such as four miniature antenna tuners for travelers and an economical version of the famous Hy-Gain HyTower vertical. We are particularly impressed, however, with the new giant SWR/wattmeter shown in photo 8. This 6.5-inch-diagonal meter definitely eliminates the old "squint-to-see" syndrome. It reads peak or average power in three ranges (20, 200, or 2000 watts) and covers 1.8–30 MHz, and you can read it from across the room. It is big-time radio for sure!

MFJ meters, tuners, antennas, and other goodies are available from amateur radio dealers nationwide, or you can contact MFJ at 1-800-647-1800 or via <www.mfjenterprises.com>.

Looking further in the stocking-stuffer category, we find the new "It Doesn't Get Any Better Than This" ham coffee mug available in 1 or 1 1/2 cup sizes from Jerry Gault, N4AVM (photo 9). One of several ham-related cartoons (plus your call) can be printed on the mug. This is an affordable gift we all can enjoy. More details (and cups!) are available at <www.n4avm.com> or call 877-809-1659.

Conclusion

Wrapping up this year's views is the gift that keeps on giving: a subscription to *CQ, CQ VHF*, and/or *Popular Communications* magazine. It is the perfect way to stay abreast of what's hot and happening in amateur radio and shortwave monitoring today. It is also like a hamfest by mail; the columns are like meetings and forums on special topics, manufacturers ads are akin to booths on the hamfest floor, and the want-ad section is like a fleamarket. What else could one want! See the ads elsewhere in this issue for pricing and contact information.

Holidays are a great time for hamming, so switch on the rig and I look forward to talking with all of you on 20 meters one afternoon or 30 meters one evening. Happy Holidays to all!

73, Dave, K4TWJ

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For really tough RFI and RF feedback problems, you can't beat the new T-4 and T-4G Ultra Line Isolators. It's isolation factor is 50% higher than previous models - far better than expensive imported copies. The T-4G goes even further with it's built-in ground strap for direct line Isolator grounding. Before coax enters your shack, stray RFI is shunted directly to ground. Use with Vertical antennas at feed point. To prevent ground loop problems, install two T-4s beweten your transmitter, linear and tuner. Use with any antenna to reduce feed line radiation. This is the RFI BIG GUN.

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Check our web site for comparison with other brands. You wont believe the difference. The others don't even come close to this level of isolation.
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18" single shield - $5.50 3' - $6.25 3' double shield - $7
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450 Ladder Line #14 stranded conductors, poly, 390 Ω 36¢/31¢
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General Catalog 80 pages of HF and VHF baluns, Line Isolators, high performance wire antennas, wire, cable, coax, connectors, station accessories, tuners, coax switches, support line, etc. It's all there. Free, allow 2-3 weeks for bulk mail, or send $2 for a Catalog by First Class

radio classics

BY JOE VERAS,* K9OCO

Beautiful Boatanchors:
The making of the Radio Classics calendar

If you're familiar with that popular swimsuit calendar, you also know its publisher sells a companion video showing how the calendar was made. It has behind-the-scenes glimpses of photographers, models, makeup artists, and assorted assistants at work in exotic locales. I'm a calendar photographer too, but my subject matter is limited to old radio gear and few of the places I visit could be described as exotic. Nevertheless, I thought this column's readers might enjoy a look at the making of the Radio Classics calendar. No plans have been made to produce a video.

The Process

A conversation with CQ Communications' Publisher Dick Ross, K2MGA, at Dayton in 1993 sparked the idea for the first Radio Classics calendar. Dick proposed the concept and I had the camera—an arrangement we've used to good advantage in the years since. More than 2000 vintage radios and keys have passed in front of my camera in a dozen years; 180 have appeared in the calendar.

It's no exaggeration to state that the story of the Classics calendar is as much about people as it is about radios. Many pairs of hands and eyes contribute to its production. I do the photography, but others are involved both before and after I click the shutter.

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e-mail: <k9oco@cq-amateur-radio.com>

Often, someone with a photogenic radio will write to let me know about his gear. In the months following the publication of that first calendar, so many offers of equipment to photograph poured in that I did not have to go looking for any subjects for several years. Some equipment is as pretty as the day it left the dealer's shelf. It may have been lovingly cared for since new, but most often the radio's appearance results from time and attention lavished on it by the current owner. Some collectors are expert in the techniques used to return equipment to its former glory. Many times, the beauty is more than skin deep, and the radios work at the same level of excellence as they appear.

Large, heavy, and valuable subject matter dictates taking my camera to where the equipment is located. Sometimes my trip is a short one. On other occasions, widely scattered locations have resulted in marathon road trips with several photo stops along the way. One such roundtrip totaled more than 6000 miles.

It's difficult to choose the 15 photos for each calendar from among the large number of images in my files. Varying the mix of receivers, transmitters, and transceivers along with the eras in which they were produced is important to the process. Dick and I talk about the gear to be included, long conversations that invariably stray from the business at hand to reminiscing about the equipment in the pictures. Neither of us is exactly ancient, but we share a fondness for the equipment of our early days as well as that from preceding eras.

I write short captions to accompany the calendar photos. It is not a major literary effort, but still requires at least one more person to take an editorial look over my shoulder. Although she hasn't been able to do much about my personal behavior, Gail Schieber, K2RED, keeps me from looking foolish in print.

Once I submit the photos and captions to CQ, the calendar effort becomes labor intensive. Some aspects of assembling the calendar could be called routine, but they require no less attention to detail. The months/days/dates matrix of the calendar retains a similar format from year to year, although the relationship of specific days and dates tends to roll around a bit. Into this matrix is plugged information on major contests, federal and religious holidays, and phases of the moon. Phases of the moon? Yes. These data are useful to werewolves and hams who operate moon bounce. Dates of recurring meteor showers are listed for those who communicate via the ionized meteor trails. Dates important to amateur radio such as the Dayton Hamvention® appear,

Photo 1– National's general-coverage NC-100X (.54–30 MHz) receiver is a first cousin to the company's ham-band-only NC-101X. (Photos © Joe Veras, 2005, all rights reserved)

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and Mother's Day is there as well. You will be happy for the Mother's Day reminder if you have ever absent-mindedly gone in the shack to get on your Sunday afternoon net instead of taking mom out for dinner.

Gail is responsible for gathering all this information and verifying its accuracy. She proofs everything and makes sure the captions appear with the correct photos. In the printing process, things can move around mysteriously. Checking and double-checking is the only way to chase the gremlins back into hiding. As someone who has become familiar with boatanchor radios and is a budding Hallicrafters collector herself, Gail is able to lend a knowledgeable eye to the creative process.

The art department's Liz Ryan plugs Gail's info into the appropriate spots in the calendar. One of the neatest things Liz does is discover some little detail or graphic element in the radio picture to use as an inset in the calendar matrix. I last see the photos when I put them on CD for submission to CQ and always wait with anticipation to see what Liz has done with the pictures and calendar layout. She has been part of the CQ family for 26 years, creating magazines, books, calendars, and various promos.

When I begin choosing the calendar photos and preparing the digital files, I am frequently in contact with Dorothy Kehrwieder, CQ's Production Manager. Dottie claims her part in producing the calendar doesn't amount to much, but her job description includes creating the schedule, finding a printer that will do a spectacular job at a great price, overseeing the calendar's printing, and production of the magazine ads and promos. Ultimately, she is responsible for its distribution.

Over the Years . . .

My job is taking photographs of vintage radios and occasionally a Morse key. The way I do that job has changed over time, especially since the 1994 calendar. The first Radio Classics photos were done on 4×5 transparency film with a Sinar view camera. The camera, the lights, and support equipment I carried with me weighed 800–900 lbs, depending on the gear required for a particular shot. My working method in those days dictated having everything I might use in the studio as part of my traveling kit, too. Some of those whose gear I photographed can tell you it often took up to four hours to do a single picture.

I am still using vacuum-tube radios, but the photo technology I employ changes with the times. When the first prototype digital backs appeared, I began using one in place of the film in my large-format cameras. I have photographed on silicon ever since, going through a continual smaller, lighter, and better evolution. My current equipment takes up 80 percent less space and weighs only a tenth as much as my early '90s traveling kit. The camera I use now is the size of a traditional 35mm single-lens reflex but gives away nothing in image quality to the boatanchor photo gear of the past.

I began working as an advertising photographer 30 years before I took the first Radio Classics photograph. Along the way, I have photographed women's fashions, food, automobiles, architecture, and products of all kinds. Not until the vintage ham gear came along did I find myself shooting something I cared about passionately. It formed the perfect union of hobby and profession.

Seeing all these great radios close up, caressing them with light, and studying them through the camera's viewfinder is a marvelous experience. Another pleasure I derive from these photo sessions is meeting the collectors. Without exception, I have enjoyed gracious hospitality at every stop. Several photo sessions initiated personal relationships that have grown beyond the realm of vacuum tubes and leaky black-beauty capacitors. For example, take my Field Day adventure with Tom Rousseau, K7PJT, a few years ago.

Tom owns the Hallicrafters SR-2000 in the 2006/2007 calendar. I first visited him and his wife Sandi at their home near Portland, Oregon on a boatanchor photo trip and returned the following year to join Tom on his annual Field Day expedition. I'll skip the logistics and Field Day preparation and get right to the part where we got out of the car—not at the FD site, but the place where we began *walking to* the site. The other participants were Andrew, KF7HB, and Mark, K7MPH. Tom, Mark, and Andrew would describe the trip as a hike, but I grew up in the Midwestern flatlands. To me this was a *climb*. We covered 4 miles and gained 2000 feet in altitude. In anyone's book it was no casual stroll, not with everything needed for the operation strapped to our backs. This included not only radio gear, but also provisions for several days' camping—food, water, tents, sleeping bags, and cooking equipment. I won't go into detail about the fall I took on the way up. Let's just say playing with pain is all a part of Field Day.

I arrived at the K7PJT/7 site out of breath, but was rewarded with a breathtaking view from Gunsight Butte, a spot 5700 feet above sea level and 8 miles east-south-east of Mt. Hood's summit. We first set about making camp and erecting antennas.

We used two Index Laboratories QRP+ transceivers powered by gel cells. Solar panels kept the batteries charged. A 40-meter folded dipole and a W7EL Field Day Special antenna helped us reach out for 346 QSOs with 47 states. I should mention that, even in late June, several feet of snow covered the ground at that altitude. We had to hand-dig and pack down flat spots in the snow for the operating and sleeping tents. My boatanchor friendships don't all rise to such heights or provide vigorous exer-

Photo 2– The Lettine Model 242 transmitter. The Lettine Radio Mfg. Co. was not an industry giant, but advertised its transmitters incessantly in the 1950s.

cise, but I value each of them and enjoy the people as much as the radios.

The Calendar Models

Now let's move on to the stars of the show. Just as in the swimsuit calendar, our main attraction is the models. The 2006/2007 Radio Classics calendar contains 15 full-color photos. A few samples accompany this article. The NC-100X is in color, but the others appear here in black and white for reasons associated with magazine production.

Brian Harris, WA5UEK, owns the NC-100X (photo 1). National's 1936 advertising called this receiver the "Perfected Super-Het." It carries signature design elements from the company's James Millen era, such as the big PW dial and coil-catacomb band switching. The 12-tube set has a crystal filter, internal AC supply, and covers .54–30 MHz. It came with an external 12-inch speaker and was listed by National at $237.50. Many dealers steeply discounted the receiver, and it was often advertised as low as $127.50. The NC-100X pictured has an interesting provenance: It once belonged to Bill Orr, W6SAI.

The Lettine transmitter (photo 2) will look familiar if you were a ham in the 1950s or have ever looked through radio magazines from that era. It seems as if the Lettine Radio Mfg. Co. spent the decade running the same ad for the same rig. In reality, several different models were advertised, but the photographs and layout lent a repetitive appearance to the Long Island, New York company's marketing. The Model 242 shown here and owned by Herman Cone, N4CH, is a 6-meter transmitter with 45 watts input (CW and plate-modulated AM) to a 6146. It sold for $89.95 in 1958. Lettine's lineup included a 2-meter version of the 242, as well as a similar-appearing Model 240 HF transmitter.

The Meissner Company is best known for the Signal-Shifter VFO/Exciters produced in the late 1930s and 1940s. The Mt. Carmel, Illinois company also manufactured the large 150-B transmitter during WW II and a Novice rig when the FCC added that license class in the early 1950s. Less well-known are its receivers, the Traffic Master and Traffic Scout. Both were sold as kits but came with the tuning unit already assembled. The Traffic Master presented here (photo 3) is a 14-tube set covering .54–31 MHz. A crystal filter provides selectivity in the 456 kHz IF. The kit costs $81.90 but did not include tubes or speaker. This set is from the collection of Bob Enemark, W1EC.

Photo 3– Meissner sold its Traffic Master receiver in kit form. The tuning unit was pre-assembled at the factory.

Heathkit's presence in amateur radio spanned four decades—longer if its test gear of the late 1940s is taken into account. The best selling product in the company's history was the HW-101 (photo 4). Thanks to Herman Cone, N4CH, for providing the '101 pictured here. The 80–10 meter transceiver, introduced in 1970, was also Heath's last all-tube radio. On the air they frequently were referred to as "Hot Water One-Oh-Ones." In reality, it was some of Heathkit's later products that truly got the company into hot water.

The E.F. Johnson Company had a long run in the radio business, too. During the 1920s and '30s, Edgar Johnson was both a manufacturer and vendor of components. The Waseca, Minnesota company moved into ham equipment with the Viking I in 1949. The Viking Challenger (photo 5) made its appearance in late 1958. The one pictured belongs to well-known AMer and transmitter builder Andy Howard, WA4KCY. A pair of 6DQ6B tubes in the final run 120 watts CW input on 80–10 meters and 85 watts on 6. The screen-modulated phone input is 70 watts on all bands. The price for a factory wired and tested Challenger was $154.75; the kit cost $40 less.

The 2006/2007 calendar features an additional ten radios. I'll paint a brief word picture of each.

N4CH is represented three more times. A Swan 350A, WRL Meteor SB-175, and Rogers Black Widow TXR10-CQ round out Herman's contribution. Swan's 350A was the 1977 iteration in the long line of 350-series transceivers. The original Swan 350 debuted in 1964.

Photo 4– The HW-101 transceiver found its way into more ham shacks than any other Heathkit rig.

Photo 5– E.F. Johnson's Viking Challenger covers 80–6 meters on CW and AM phone.

The SB-175 is a double-sideband, suppressed-carrier transmitter. DSB was a popular mode at WRL/Globe in the '50s and '60s. The menacingly named Black Widow is a 6-meter AM transceiver. An article about the restoration of a 2-meter Black Widow appeared in the Summer 2005 issue of *CQ*'s companion magazine, *CQ VHF*.[1]

I was fortunate to meet Harry Snyder, W7HC (now a Silent Key), and photograph his Collins R-390. This '390 is a Rick Mish restoration and a stunning example of what many consider the ultimate boatanchor receiver.

In olden days, Sears, Roebuck and Co. sold amateur radio gear. The 1936 Sears catalog carried the Silvertone 5656A communications receiver. The 8-tube set is similar to Hallicrafters' Super Seven and S-8. It was manufactured by Chicago's Howard Radio Company and sold by Sears under its Silvertone house brand. The calendar receiver belongs to Bob Enemark, W1EC.

Jon Weiner, K1VVC, owns the Millen 90810 transmitter. The crystal-controlled transmitter covers 20, 10–11, 2, and 6 meters using plug-in coils. It runs 75 watts with an 829B and requires an external power supply.

In response to the emerging TVI problem, Eldico upgraded its TR-75 transmitter. The improved version incorporated better filtering and shielding and was released in 1950 as the TR-75 TV. I photographed the Eldico rig during a visit with Al Culbert, KØAL. Not only did Al's collection yield several more subjects, he was instrumental in helping locate other rare equipment in his area.

Brian Harris's HQ-160 is a handsome example of a classic Hammarlund general-coverage receiver. It dates from 1958, is double conversion, and uses a Q-multiplier and T-notch to sort out QRM.

Hallicrafters produced a 2-kilowatt SSB, 1-kilowatt CW transceiver in 1965. The 18-tube desktop package weighs 26 lbs, not including the power supply. Tom Rousseau, K7PJT, contributed the fine example in the calendar.

Not to be outdone by Hallicrafters, National brought out its own kilowatt desktop transceiver in 1969. The NCX-1000 has an internal AC supply and is solid state except for the driver and final tubes. It is rated at 1000 watts SSB and CW, 500 watts AM and RTTY. Thanks to Joel Thurtell, K8PSV, for making his transceiver available for photography.

In words and pictures, that is the story of the 2006/2007 Radio Classics calendar. It is at the printer as I write. By the time this column appears, the calendar will be available from CQ. Details on getting one of your very own are found in the ad on page 72 of this issue. It can also be purchased at hamfests and from vendors.

I close with some personal business. In the March 2005 "Radio Classics" column about an Ocean Hopper, I related the part one of the KnightKit receivers played in my life. I also spoke of my dad. At a time when his grasp of the present was slipping and nearly all memory of the past had fled, Dad recalled in crisp detail the evening he supervised my assembly of the Ocean Hopper kit. He was 38 years old then and I was 12. Now I am 60 and he is gone. The K9NA key fell silent in August. Life is loss. I probably won't become accustomed to it until I head that way myself.

73, Joe, K9OCO

Note

1. Ray Grimes, N8RG, "The Classic 'Black Widow' VHF AM Transceiver," *CQ VHF*, Summer 2005, p. 10.

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qrp

BY DAVE INGRAM,* K4TWJ

QRP Projects

Happy Holidays, dear friends and fans of QRP. Here's wishing you the best of everything during this festive time of the year, and may you always enjoy a good life in the world of low-power signals. Yes, and with a bit of spare time hopefully available for pursuing favorite interests, you may be thinking of building another QRP fun project or (if you live in warmer climates) putting up a new antenna. That is precisely the focus of this month's column. However, before jumping into discussions, we invite you to ponder an interesting question.

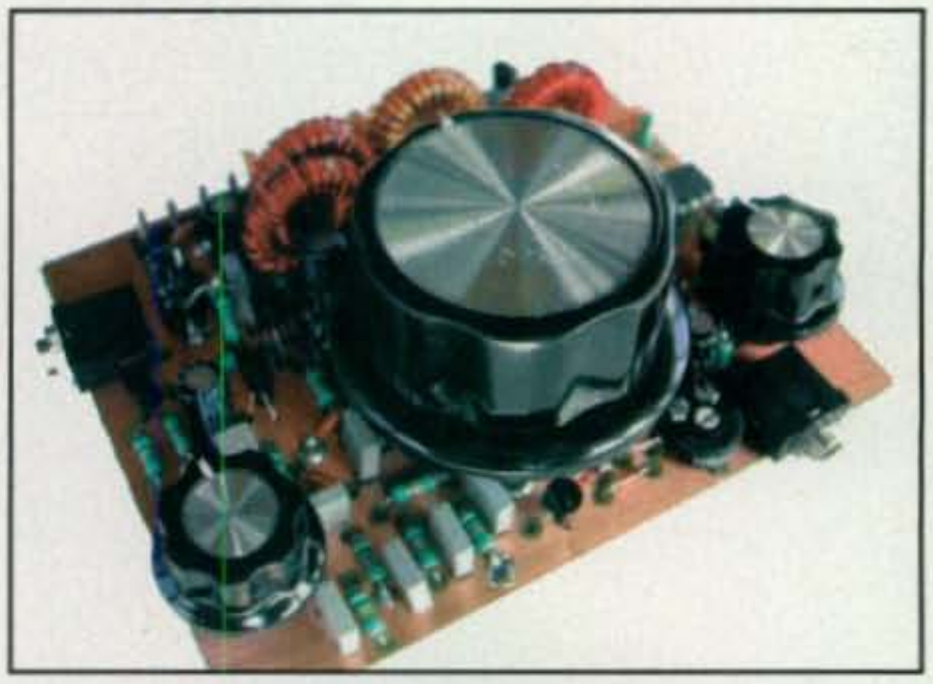

Photo A– This is the Brent CW transceiver available from Walford Electronics in Great Britain. The little gem is fully contained on a single PC board with upright controls for desktop use or easy mounting in a case of your choice. The rig sports a direct-conversion receiver with narrow filter, side tone, RIT, and full QSK, plus a hefty 2-watt transmitter.

Is Wider Better?

Which would you say is more appealing, a wider or a more narrow receiver bandwidth? The instinctive answer here is narrow to minimize interference, but pause a minute and consider the overall picture. If you have operated QRP for any length of time, you probably developed the unique ability to copy weaker stations through all types of noise and interference. Assuming an adjacent frequency station is not acting on or clamping your receiver's AGC, you can probably concentrate on one tone and ignore everything else, right?

Now consider how much time you spend in rapid-fire QSOs in contests and/or monitoring QRP activity around a popular gathering frequency such as 7.040 or 14.060 MHz. During contests, the ability to hear stations on nearby frequencies—stations you can quickly snag for additional QSO credit after working an on-frequency station—can actually increase your QSO rate.

Monitoring favorite frequency activity using a wide bandwidth and listening to specific tones/stations is akin to using a no-tune scanner. Personally, I say nothing enhances a shack more than the melodious sounds of signals when a band is open. It is like a room filled with special guests. Those older and/or lower cost receivers may have an advantage that has been overlooked.

Now let's talk homebrew!

The Brent Transceiver

Our friends in Great Britain are quite enthusiastic about QRP, and some of their recently introduced kits accurately reflect that fact. Consider, for example, the neat little Brent CW transceiver kit being produced by Tim Walford, G3PCJ (photo A). This is a single-band transceiver with all parts, sockets, and controls mounted directly on its 80 × 100 mm PC board for easy assembly. The board even has its own feet so you can use it sitting flat on a desk or mount it in a box of your choice with its main controls on the top.

The Brent sports a direct-conversion receiver with a narrow 750-Hz audio filter, a stout-hearted transmitted with 1.5 to 2 watts output, plus RIT and full break-in operation. The basic kit is produced for 80 meters, and optional mini mix kits are available for converting to 40- or 20-meter operation.

Technically speaking, the transceiver utilizes a 74HC04 IC as a local oscillator, transmit driver ,and T/R controller, while the transmitter uses a pair of BS170s (popular British FETs) to deliver 2 watts output with a 13-VDC supply. The Brent also works well when powered by a 9-volt battery—and power output is around 700 mw. More BS170 FETs are used in the receiver, which also includes an adjustable sidetone and smooth muting without thumps on transmit.

A creditable number of components are squeezed onto the transceiver's single PC board, so a bit of experience building small kits is desirable before assembling a Brent transceiver. I would say a small soldering iron, thin solder, a steady hand for soldering fine connections, and some patience to wind four toroid coils should do the trick. It is an impressive kit and is available for approximately 38 British pounds for the 80-meter version or 53 pounds for the 40- or 20-meter version. Walford Electronics is not equipped to handle charge-card orders, so ask your bank about converting dollars to pounds or Euros so you can send a check in the proper currency. As an alternative, Walford may be able to make the conversion in England if bank charges are reasonable. Presently, approximately $1.3 U.S. equals one Euro. Walford Electronics' website is <www.users.globalnet.co.uk/walford> and the e-mail address is <walford@globalnet.co.uk>.

Mini MOSFET Amp

During a recent QSO, a fellow QRPer told us about a small RF amplifier he built to use during adverse

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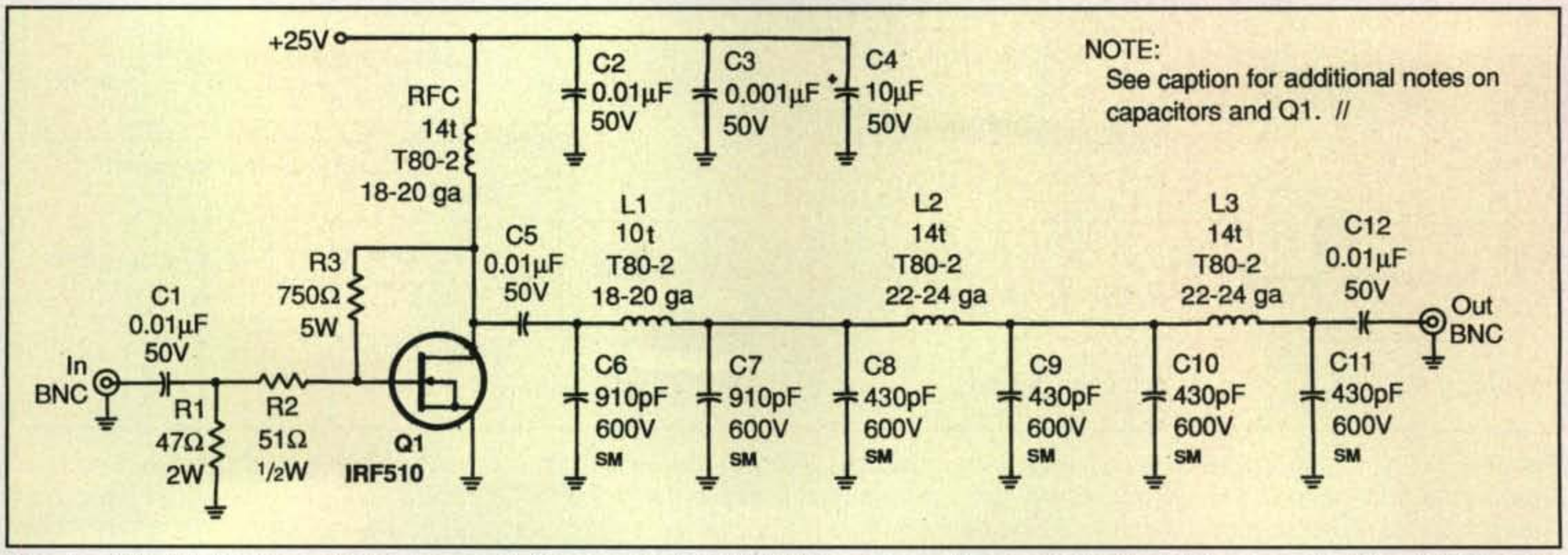

Fig. 1– Circuit diagram of the low-cost 40-meter MOSFET RF preamp discussed in text. Power output is 15–25 watts depending on supply voltage and drive. All capacitors should be rated at 50 volts or higher and IRF510 MOSFET should be mounted to a large heatsink—preferably with a small fan added for extra cooling.

band conditions. It sounded quite attractive, so naturally we asked for more details—and permission to share that information with column readers. Our friend agreed, but requested we not mention his name/call. We are sure many readers would like to home-assemble a copy of this mini amp (with their own special mods or changes), so its circuit diagram is shown in fig. 1.

The amplifier uses a single IRF510 power MOSFET plus a handful of additional/support components and delivers approximately 25 watts output from 25 volts and 3 or 4 watts input. It is designed for 40-meter operation, but its output filter (which in this circuit is a three-section item consisting of C6, C7, & L1; C8, C9, & L2; plus C10, C11, & L3) is easily rebuilt for 30 or 20 meters. Reducing L1, L2, and L3 by a few turns and changing the capacitors to 330 pFd for 30 meters or 270 pFd for 20 meters should prove a good starting point. Resistor R1 ensures a good impedance match and low input SWR regardless of the utilized band, so no input circuit changes are necessary. Likewise, C1, C5, and C12 are RF fed through capacitors that couple signals in/out regardless of the utilized band, while C2, C3, and C4 bypass to ground any stray RF energy that is not choked from reaching the +V battery line by RFC1.

The IRF510 is an economically priced and readily available MOSFET of proven performance. We even have found the little device at RadioShack, priced under $3.00. Just remember to use a *large* heatsink with it—preferably one with four or five square inches of surface for dissipating heat. If it gets too hot to leave your hand on it, the sink is not large enough. Adding a small cooling fan and/or reducing the supply voltage from 25 to 13 volts helps avoid meltdown, although halving the voltage also halves the output. Still, 12 or 15 watts for 2 or 3 watts input is a good deal.

Our friend did not say anything about the IRF510 operating bilaterally, but I have found it also passes received signals without loss of level and thus eliminates the need for T/R switching. That, in our opinion, makes the little amp a real bargain. Try one. You will like it!

Long Wires for QRP

One of the most continuously popular antennas among QRPers, especially those operating from portable locations, has to be the proverbial longwire (fig. 2A). It installs in a flash, it is simple yet effective, and assuming it is made with thin insulated wire to match its background, is almost invisible to untrained eyes. The usual choice here is a random-length wire tossed over a few conveniently located tree limbs and connected to a tuner capable of matching anything from a few ohms to a few thousand ohms. There are, however, some important facts one should keep in mind when using a random-length wire: It must be worked against a good ground, it should be at least a quarter wave long for your desired band, and it

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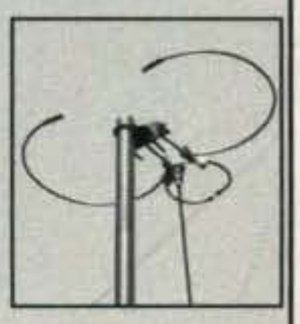

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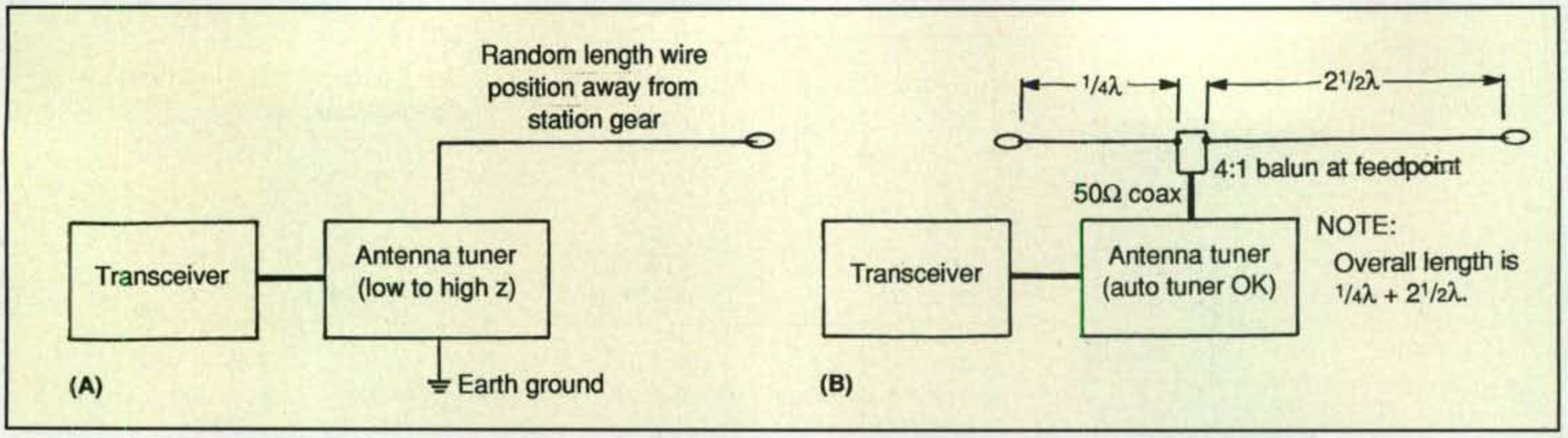

Fig. 2– The typical longwire antenna as illustrated in (A) is a random length of wire with rather unpredictable feedpoint impedance and performance. Conversely, the antenna illustrated in (B) is 2.5 wavelengths long for a selected band and exhibits a more predictable feedpoint impedance within the range of a rig's automatic antenna tuner and offers good signal gain to boot.

must be oriented to minimize RF feedback (the old "hot mic" and/or blinking light syndrome).

The wire radiates along its full length, so the best bet is to orient it away from rather than over or beside station gear. Placing the related tuner on a nearby window sill and passing the wire through or beside the metal screen (which can act similar to a Faraday shield) usually gives good results.

Would you like to move up a couple of steps in performance? Consider an extra-long wire antenna such as the one shown in fig. 2B. This little romper is 2.5 wavelengths long for a selected band, and it gives your QRP signal big-time clout. It also has a 4:1 balun at the feedpoint and connects to a transceiver via a non-specific length of 50-ohm coax cable—nice for ensuring RF goes that-a-way rather than infesting your rig.

Assemble the antenna using a few rolls of speaker wire (separate each roll into two individual wires, and then connect the two wires end-to-end to double their length and save money). Support the wire/antenna every 40 or 50 feet with clear fishing-line hangers passed over tree limbs. Spray the balun and coax with Krylon® paint to blend with (hide in) the background, and then hit the airwaves in style! This antenna's design, incidentally, came from the 21st Edition of the *Radio Handbook* (some folks call it the "West Coast" handbook), which my good friend Bill Orr, W6SAI, and I worked on together before he became a Silent Key. The antenna is highlighted here in recognition of Bill's fine works. May the memory of him stay with us forever.

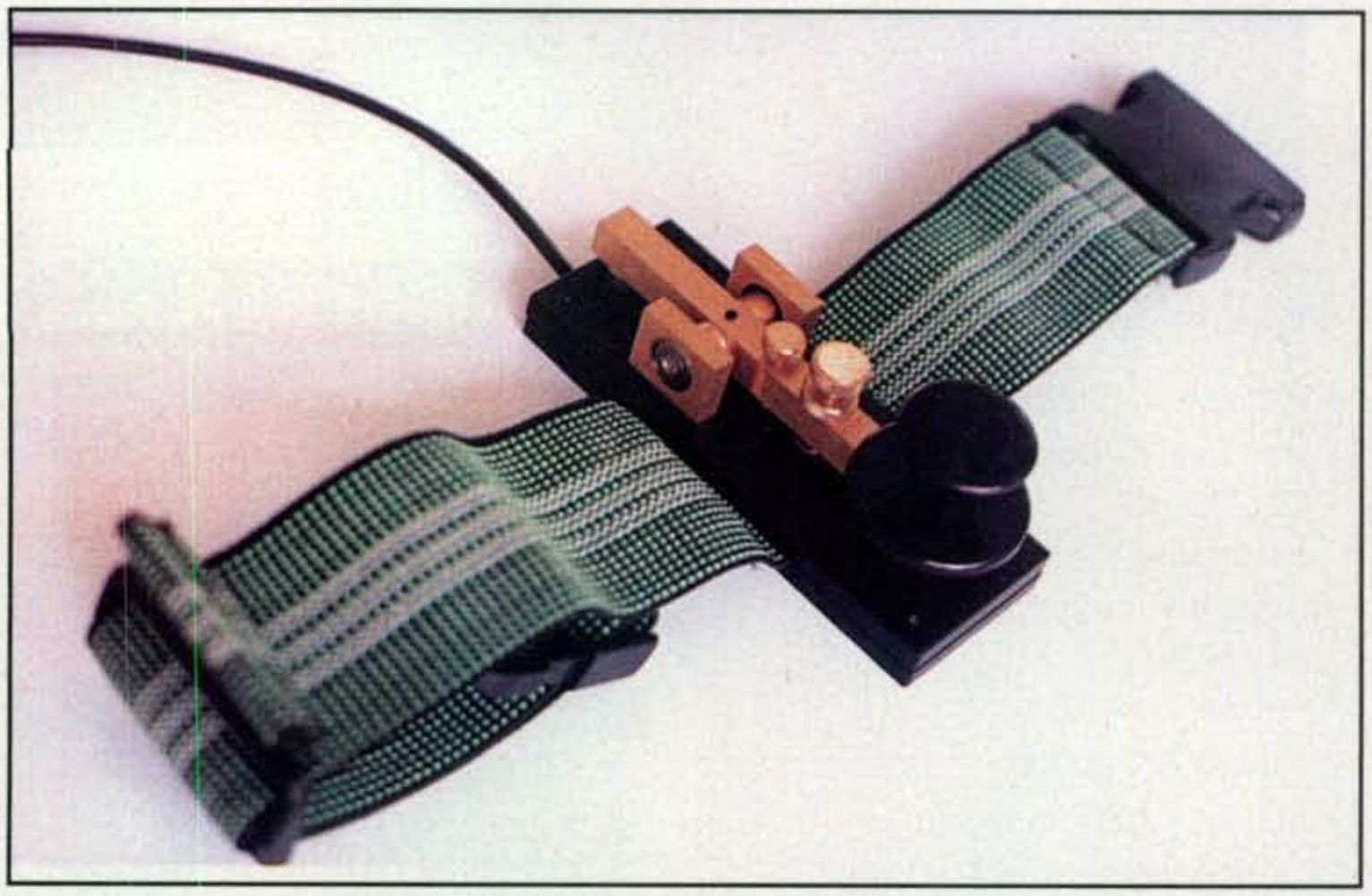

Photo B– This new leg-strap hand key made by R. A. Kent of England and imported to the U.S. by Kent USA in Kentucky is the perfect item to spice up your QRP CW pursuits. It measures 5 inches long by 2 inches wide, is fully adjustable, has a quick-snap strap and a flat and textured base to hold it in place, and it works great. It is ideal for portable operations of all types. It is available from Kent USA.

New QRP Key

Wrapping up this month's column is a new hand key especially made for travel-oriented QRPers (photo B). The key is made by R. A. Kent of England and imported to the U.S. by Kent USA in Kentucky. It is well-balanced and quite enjoyable to use. It has both tension and gap adjustments, includes permanently lubricated and sealed ball bearings at the fulcrum, and sports a traditional British-type "top hat" knob for class. All the leg-strap keys I have seen have been cumbersome to strap on and awkward to use (they flop and slide like crazy). This one, however, is well balanced and has a textured base plus a wide strap and a quick-snap fastener so it holds in place like a champ.

Whether you enjoy CW mobile, easy-chair portable, or just want a pleasant variation for the ARRL's Straight Key Night (held on January 1st every year), this key fills the bill. Try it at a 45-degree angle, too. I find that position is perfect for sending better and faster than usual CW with a hand key. This new leg strap key is available from Kent USA, 214 Second St., Manchester, KY 40962 (telephone 606-599-4041; e-mail <jfburns@alltel.net> or via <www.outbackerantennas.com>.

That overflows available space for this month, but stay tuned for more hot ideas and cool build 'em projects next time. Also remember to get in some good QRP on-the-air time every day (or night!).

73, Dave, K4TWJ

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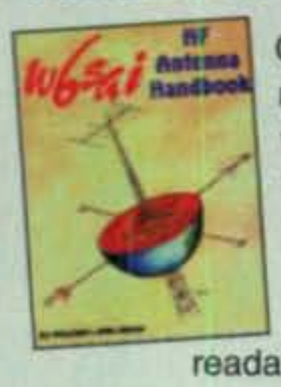

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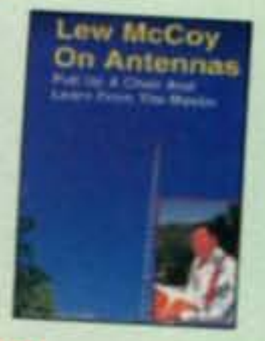

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RSGB 2002 Ed, 224 pages. Packed with around 50 "weekend projects," Practical Projects is a book of simple construction projects for the radio amateur and others interested in electronics. Features a wide variety of radio ideas plus other simple electronic designs and a handy "now that I've built it, what do I do with it?" section. Excellent for newcomers or anyone just looking for interesting projects to build.

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The Antenna File

RSGB. ©2001. 288 pages. 50 HF antennas, 14 VHF/UHF/SHF antennas, 3 receiving antennas, 6 articles on masts and supports, 9 articles on tuning and measuring, 4 on antenna construction, 5 on design and theory, and 9 Peter Hart antenna reviews. Every band from 73kHz to 2.3GHz!

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MFJ *in-line* Calibrated *RF Ammeters*

. . . for tuning your antenna tuner/xmtr/amp for maximum radiated power … for determining antenna feedpoint impedance… for comparing antennas and tuners … for trouble shooting . . . checking for changes

MFJ-834
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MFJ-834 Coax In-Line Calibrated RF Ammeter

Connect the MFJ-834 *Coax In-Line* RF Ammeter between your antenna and tuner/transmitter/amplifier and measure antenna feedline current in 3 calibrated ranges.

Use it . . . for *tuning* your antenna tuner/transmitter/amplifier for maximum radiated power … for *determining* antenna feedpoint impedance… for *comparing* antennas and tuners … for *trouble shooting* . . . and for *checking* for changes.

Tuning for *maximum* feedline current for any given antenna *always* gives maximum radiated power!

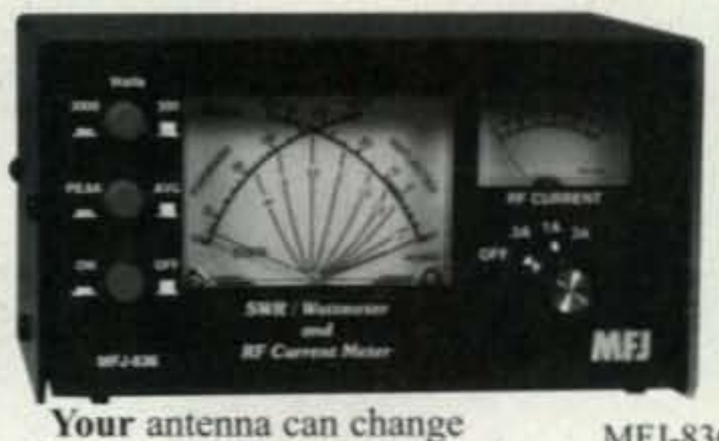
Any adjustment -- transceiver or amplifier tuning/loading controls, antenna tuner settings, whatever -- that increases feedline current improves power transfer and gives you a stronger radiated signal.

Radiated power increases rapidly because power increases as the square of the current.

Minimum SWR *does not* always mean maximum radiated power -- your tuner or lossy coax may be dissipating power -- and you may not get peak output power even if your tuner or amplifier is properly tuned.

Use the MFJ-834 to determine best antenna tuner settings and to compare various tuners.

Calculate your antenna *feedpoint impedance* by dividing your applied power by the square of the feedpoint current.



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Your antenna can change when you apply power -- insulators break down, traps heat up, capacitors leak -- and your feedpoint impedance may be drastically different from your SWR Analyzer measurements.

MFJ RF ammeters are rugged, read accurately over 1-30MHz in three *linear* ranges (.3, 1, 3 Amps) and barely perturb the antenna.

Large 3-inch lighted meter. Use 12 VDC or 110 VAC with MFJ-1312D, $14.95. SO-239 connectors. 6Wx3½Hx4½D inches.

MFJ-834H. $79.95. Like MFJ-834, but 3, 10, 30 Amps *high current* ranges.

MFJ-836 all-in-one RF Ammeter/SWR/Wattmeter

The MFJ-836, $129.95 is an *all-in-one* RF Ammeter/SWR/Wattmeter! You can quickly determine feedpoint impedance and monitor antenna system for detrimental changes under power.

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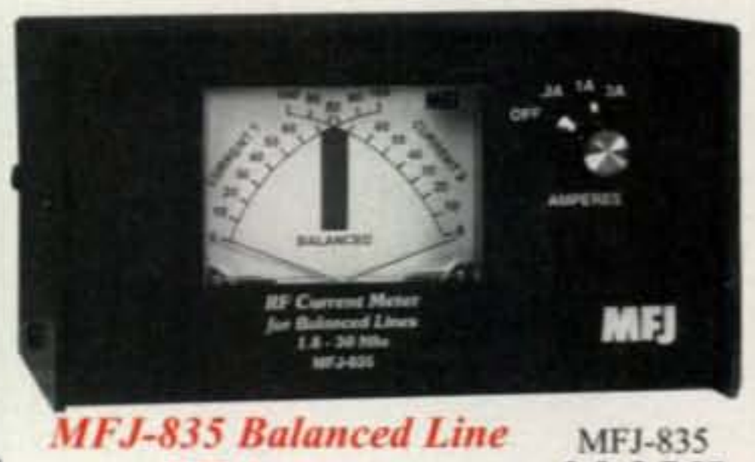

MFJ-835
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MFJ-835 Balanced Line RF Ammeter

***How** do you detect imbalance in open-wire or ladder line?* **By** measuring and comparing each feedline wire current -- your feedline is balanced if the currents are equal.

The MFJ-835, $119.95 *BalancedLine RF Ammeter*™ is *two* identical calibrated RF ammeters using an MFJ *Cross-Needle* meter.

Feedline currents are *simultaneously* displayed on separate calibrated scales in three ranges (.3, 1, 3 Amperes).

Balance is clearly revealed on MFJ's exclusive *BalancedBar*™ -- when currents are balanced, the dual needles *cross in the center* -- no matter the actual current.

If the needles cross within the vertical *BalancedBar*™ the balance is within 10%. If not, you know which line is unbalanced and by how much.

Equal currents in the feeder wires minimize feedline radiation and reduces pattern distortion, RFI, TVI and wasted power. You could lose up to 10% of your power.

Imbalance is due to feedline not being perpendicular to antenna, if one side runs close to metal or is shorter or closer to ground.

The MFJ-836 helps you solve all your unbalanced problems.

Heavy-duty 5-way binding posts for feedlines. Use 12 VDC or 110 VAC with MFJ-1312D, $14.95. 6Wx3½Hx4½D in.

Calibrated *Clamp-On* RF Ammeter

MFJ-854
$99.95

MFJ-854 *Clamp-On* RF Ammeter quickly snaps over wires and cables to measure RF currents flowing in antenna elements, radials, ground wires and on outside of coax.

Tune counterpoises, radials and ground systems. Balance your radials. See how much signal is radiating from your antenna, feedline or ground wire. Study/optimize your antennas for peak performance. Find current peaks/nulls on antennas/ feedlines. Plot current profile, measure and tweak current flow at each antenna element in phased arrays.

Determine your antenna feedpoint impedance, radiated power, power losses and efficiency. Track down RFI-causing currents on coax shield, rotator cable, guy wires, house wiring, telephone and television cables.

Has five *calibrated* ranges to 3 Amperes including sensitive 30 mA range with linearity compensation to assure accuracy at low currents. It's sensitive enough to use an MFJ SWR Analyzer as the source to drive your antennas.

Less than 1 mA on super-sensitive *Variable Range* yields usable meter deflection for tracking RFI on household wiring and cables.

1-30 MHz plus. ½ inch diameter cables. 2 ½ Wx5½Hx1½D in.

Calibrated *mini Clamp-On* RF Ammeter

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MFJ-853
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MFJ-853 calibrated *mini Clamp-On* RF ammeter accurately measures RF current in antenna elements, radials, ground wires, coax shield. *Non-metallic* lightweight case minimizes electric field disturbances for accurate readings -- clamp on mobile whip/ vertical. Adjust for maximum radiated current. Determine radiated power/losses. Profile its current distribution -- it's maximum at base and tapers to zero at end.

Use like MFJ-854 to do many of its tasks. 0.3, 1, 3 Ampere ranges. 2¼Wx3¾Hx1D".

MFJ-853H, $59.95. Like MFJ-853, but has 3, 10, 30 Ampere *high-current* ranges.

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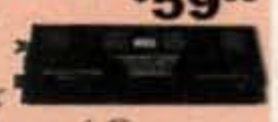

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REMINDER!

Two New CQ "Waking Up DXing" Programs Begin in 2006

January 1 Start Dates for New CQ DX Marathon and CQ iDX Award

January 1, 2006 marks the beginning of two exciting new parts of *CQ*'s "Waking Up DXing" program ... the CQ DX Marathon and the CQ iDX Award.

The CQ DX Marathon

The CQ DX Marathon is a year-long operating activity, running from January 1 to December 31 of each year, beginning in 2006. The goal is to contact as many different countries and CQ Zones as possible during the course of the year. The activity begins anew each January, so there's no accumulation of credit for past contacts. You've got to get on the air and work DX! Complete details are in the May, 2005 issue of *CQ* (p. 16) and on the CQ website at <http://www.cq-amateur-radio.com/DX Marathon May.pdf> (be sure to include the spaces).

The CQ iDX Award

The CQ iDX Award is a "beginner's" DXing program, encouraging all hams —even those limited to VHF FM—to begin enjoying the fun of contacting stations in faraway places through the use of systems using VoIP (Voice over Internet Protocol) to link repeaters and amateurs around the world. The initial level of the award is given for contacting stations in at least 25 different countries. At least one end of each contact must be made by radio; confirmations are required, and the top level of the award is for 100 countries. Contacts that count for this award do not count for traditional CQ awards. Only contacts made January 1, 2006 and later qualify for the CQ iDX Award. Complete details are in the June, 2005 issue of *CQ* (p. 20) and on the CQ website at <http://www.cq-amateur-radio.com/IDX Award June.pdf> (be sure to include the spaces).

CQ DX Field Award

The third component of CQ's "Waking Up DXing" program — the CQ DX Field Award — is already up and running and very popular. At press time, certificates were at the printer and are expected to be completed and mailed to initial awardees before the end of the year. Details on the CQ DX Field Award are in the April issue of *CQ* (p. 22) and on the CQ website at <http://www.cq-amateur-radio.com/cqfieldaward.html>.

Good luck and Good DX!

60 Great Things About Ham Radio

In celebration of *CQ*'s 60th anniversary in 2005, we've come up with 60 great things about ham radio which we'll bring you each month, five at a time. We're sure you'll have more great things that we haven't thought of, so when we're all done, we'd love to compare our list with yours.

—*W2VU*

This month we'll wrap up with some of the challenges and pleasures of being an active ham.

56. Operating QRP from some remote location – The opportunity to get on the radio from a remote location has its own distinct challenges and pleasures, both of which are multiplied when you decide to do it with low power (QRP).

57. Getting through on CW when nothing else will – Sometimes, voice just won't cut it on a marginal path, and yes, some of today's hot digital modes can be copied below the noise … providing you've got a working computer at both ends. The only computer you need to copy Morse code is the one between your ears.

58. Experimenting with new modes and new technology – The future of radio communications is—or should be—in our hands. We have been given the freedom and flexibility to try new ways of communicating or to find new ways of using existing technology. We need to continue to be pacesetters in advancing communications technology.

59. Experimenting with antennas – With components shrinking to near-microscopic size, it sometimes seems there's not much left to tinker with and build anymore. Not so, especially with antennas, a perennial favorite for experimentation. Space restrictions and no-outside-antenna rules are driving our creativity in this part of ham radio.

60. Reading *CQ*! – No challenge here, we hope; just enjoyable, educational and easy-to-understand reading every month. We hope *CQ* has been, and continues to be, one of the many things that makes ham radio great for you!

That's our list! What have we missed? We'd love to hear from any of you who have more "Great Things About Ham Radio" to share. *73, The Editors*

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BY JOE LYNCH,* N6CL

New 47-GHz Terrestrial Record

The following is from the Microwave Reflector: "On August 21, during the ARRL 10 GHz and Up Cumulative Contest, Frank Bauregger, W6QI, and Gary Lauterbach, AD6FP, completed a 47-GHz contact over a 313-km distance to extend the current world record on that band. W6QI operated from Frazier Mountain DM04MS north of Los Angeles. AD6FP operated from Devil Peak DM07DM just south of Yosemite. Signal margins were >40 dB on the W6QI end and about 8 dB on the AD6FP end. The weather conditions were sunny, clear, warm, and dry at both locations.

"An earlier attempt was made from Mt. Frazier to Mt. Oso (375-km path) at 0600 on Saturday morning with no results. However, after successful completion of a 170-km QSO between Frazier and the valley floor (DM06AB) on Saturday evening, it was decided to try Devil Peak on Sunday.

"The station details are as follows: W6QI: 12" splash plate dish, +10 dBm TX power, 8 dB NF, OCXO locked; and AD6FP: 36" Cassegrain dish, +45 dBm TX power, 4 dB NF, Rb locked."

The above report is courtesy the September 2005 issue of "The VHF Journal," the monthly newsletter of the Rochester VHF Group.

Another Record Exceeded

On October 13, 2005, at approximately 1600 UTC, Bob McQuarrie, ZL3TY, in RE57OM, made a 2-meter EME QSO with Nicolás Garcia Vera, EA2AGZ, in IN91DV, a terrestrial distance of 19,434 km. This QSO has bested the previous EME distance record. Bob reports that they had only a 20-minute common moon window, beginning at 1550 UTC, but easily completed in ten minutes. This report is courtesy the Moon-net reflector.

DX Record Correction

Previously in this column I mentioned that Tommy Thomas, KH6UK, and John Chambers, W6NLZ, were the first to make contact between Hawaii and the U.S. on 220 MHz. I incorrectly stated that their distance record still stands today. In fact, Paul Lieb, KH6HME, in BK29GO, and Jack Henry, N6XQ, operating as XE2/N6XQ, in DL29CX, extended the distance by 63 miles on July 15, 1989.

AMSAT General Meeting Internet Success

Because of the destruction to Louisiana caused by Hurricane Katrina, AMSAT-NA cancelled its annual meeting in October. It was to have taken place in Lafayette. What went forward, however, was the General Meeting, which took place on October 7. The following, which describes the unusual way in which the meeting took place, is from the AMSAT-NA website:

The AMSAT General Meeting was held in Pittsburgh, and for the first time in history AMSAT members across the globe could attend via EchoLink.

*e-mail: <n6cl@sbcglobal.net>

VHF Plus Calendar

Dec. 1	New Moon
Dec. 4	Very Poor EME conditions
Dec. 5	Moon Perigee
Dec. 8	First Quarter Moon.
Dec. 11	Moderate EME conditions
Dec. 14	*Geminids* meteor shower peak
Dec. 15	Full Moon
Dec. 18	Moderate EME conditions
Dec. 21	Winter Equinox and Moon apogee
Dec. 22	*Ursids* meteor shower peak
Dec. 23	Last Quarter Moon
Dec. 25	Moderate EME conditions
Dec. 31	New Moon
Jan. 1	Moon Perigee. Poor EME conditions
Jan. 3	*Quadrantids* meteor shower peak

**EME conditions courtesy of W5LUU.*

"This is really cool," in the words of AMSAT President Rick Hambly, W2GPS. "It was difficult working out the logistics, but it worked!" AMSAT members in approximately 12 countries attended the EchoLink conference and had equal access to the proceedings.

The General Meeting was conducted from Pittsburgh via the AMSAT EchoLink Conference, and was simultaneously relayed by Paul Williamson, KB5MU, over the EduNet conference. Questions by worldwide participants were typed in by text messaging and relayed to President Rick Hambly by AMSAT Board members Dr. Tom Clark and Emily Clarke, who worked to make sure every question was asked and answered.

"We got the message," President Hambly was heard saying afterward. "We conducted a successful meeting because we were open and in touch with the membership."

Many questions and salutations were relayed to the board, and Rick and others fielded questions as they came in. Many were recorded by AMSAT Video News reporter Don Jacobs, WB5EKU, who will include segments in a future production of the AMSAT Video News.

The AMSAT Board would like to thank all who participated in this bold experiment. It was an experiment, and when the logistics allow we are looking forward to repeating it again.

More about EchoLink

The above story about AMSAT's use of EchoLink is remarkable for its innovation. For the first time EchoLink was used as a conferencing vehicle for AMSAT.

While others have used EchoLink for conferencing, many of us remain ignorant of the basic services offered through participation in EchoLink. For information and a link the software, please see <http://www.echolink.org>. The historical account and general information about EchoLink is written and copyrighted by Thierry Lombry, ON4SKY, and is found at the website: The History of Amateur Radio 17 (URL: <http://www.astrosurf.org/lombry/qsl-ham-history17.htm>). Thierry has graciously granted me permission to reprint it here:

Work the World with EchoLink

Developed in early 2002 by Jonathan Taylor, K1RFD, EchoLink is a program using the Voice-over-Internet Protocol, VoIP for short, to establish long-distance com-

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munications (DX-like). The product has spread rapidly among the ham community and is today used by over 120,000 hams in 147 countries, with approximately 2,200 connected users daily!

How can we explain such a success so rapidly? First we have to understand how this application works. Instead of using ionospheric layers to establish long-distance communications, K1RFD suggested radio amateurs use the VoIP protocol, thus the Internet in combination with RF linking, and V/UHF FM transceivers to work hams. In this way, he says, even hams limited to V/UHF bands and having difficulties in working DX stations can use Internet to have conversations with hams located all over the world, at distances far exceeding the performance of their FM transceiver.

Indeed, with time running it has appeared that this "web-assisted" tool has proven to be very useful and very performing.

EchoLink uses two different systems:

• Repeater linking: In this configuration repeaters are linked each another through VoIP. Each amateur works with a fixed, portable, or mobile VHF or UHF FM transceiver and transmits to a FM repeater located a few dozen kilometers away. Of course if there is no repeater within 30 km of your QTH, you cannot use this linking with EchoLink and you will have to work simplex.

• Simplex linking: In this configuration there are two options. Either the amateur uses a V/UHF handheld or mobile transceiver or he is directly connected to the Internet.

In the first case the ham works remotely and transmits to his base station. This method uses a VOX interface linked to a computer that process signals digitally before they are sent over the Internet. In the second case, the ham is directly connected to the Internet through his computer using a low speed modem (as low as 36K) or a DSL connection. Therefore, in simplex linking the connection can be done to other simplex nodes, to repeaters, or even to hams directly connected to the Internet while not using any ham equipment whatsoever.

Repeaters using simplex links with a radio receive a callsign with a -L suffix; repeaters running the software connected to a radio receive the -R suffix. Both run in the SysOp mode.

Who can use EchoLink? All licensed hams—and only licensed hams—can use EchoLink, even if you are limited to V/UHF or a holder of a Novice license. It doesn't matter if you do not have a good antenna or if you only own a low power VHF or UHF transceiver. You can work with EchoLink without radio equipment, simply using the Internet if you like! For more detailed information on EchoLink, see the URL: <http://www.astrosurf.org/lombry/qsl-echolink.htm>. *(Editor's note: This dedicated URL will be the basis for an article on EchoLink to appear in a future issue of* CQ VHF *magazine.)*

The Future of Conferences

While AMSAT-NA's recent General Meeting took place aurally, I believe that the future of conferences could be in video conferencing. For example, as the technical program chair at the Central States VHF Society conference this past July, I thought of how it might be possible to have each presentation given live via video streaming, or archived for future retrieval. Such technology for doing so is available today.

While it is presently beyond the pocketbooks of most amateur organizations, places of higher education, such as Oklahoma City University, are using a video presentation and retrieval program from Sonic Foundry called Mediasite (please see <http://www.mediasite.com> for more information on this product line). In this program a presentation, recorded for future distribution, includes a camera shot of the presenter along with a PowerPoint slide presentation that is synchronized with the presenter. As the presenter is talking, the slides are sequenced seamlessly so that the person viewing the presentation sees and hears the presenter, along with seeing the PowerPoint slide.

I believe that we hams have the technical wherewithal to develop such presentations so that ham radio conference presentations can be made available live via the Internet, as well as archived for future use and distribution. I think that the leadership of AMSAT-NA has stumbled onto something quite by accident as a result of having to make Herculean changes to accommodate the hurricane disasters. Certainly seeing how innovative it was for them to have an aural conference via EchoLink should be motivation for them or other organizations to seize the opportunity to develop their own sort of Internet-based conference in the near future. I will be looking forward to such developments and reporting on them in future columns as I am made aware of them by you.

Silent Keys

There are three hams of particular note who have become Silent Keys in recent weeks. They are Bill Seabreeze, W3IY, Jack Carlson, N3FZ, and Hugh Cassidy, WA6AUD.

Brian Skutt, ND3F, wrote the following tribute to Bill, W3IY, and it appeared on the VHF reflector:

Bill Seabreeze, W3IY, became a SK this week, after a long bout with cancer. He was a partner, sometimes a head-to head com-

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petitor, most importantly he was a true friend. Bill embodied the "Radio Amateur's Code" perhaps more than any person I have known in 40 years of ham radio:

Bill was:

Considerate . . . never knowingly operates in such a way as to lessen the pleasure of others. In fact, he made it more fun for all of us, putting rare grids on the air, instigating and encouraging Microwave Activity Days, and gently enforcing good operating practice by example!

Loyal . . . offers loyalty, encouragement, and support to other amateurs, local clubs, and the American Radio Relay League, through which amateur radio in the United States is represented nationally and internationally. Bill supported clubs, including numerous local clubs, the PVRC, the Grid Pirates, the Packrats, and others as a member and supporter. He went the extra mile to give briefings and demonstrations of roving and microwave operations. He was a great encourager of new hams, helping not only by his infectious example, but also by giving equipment, antennas, and time to newcomers. One fond memory is his stand on the various rules changes that have happened over the years. He simply got on the air and operated; that was and is the most important thing!

Progressive . . . with knowledge abreast of science, a well-built and efficient station and operation above reproach. Most don't know that Bill was an awesome engineer and designer from HF to microwave and up. We worked on some projects together, and Bill was the cornerstone to a successful project design and implementation for a millimeter wave system. He also held some distance records at millimeter wave. I have many fond memories of Thursday night work and strategy sessions at Bill's lab—started off by an early dinner of Chinese food at a local restaurant, and sometimes going well into the night until we squeezed the last dB out of a project!

Friendly . . . slow and patient operating when requested; friendly advice and counsel to the beginner; kindly assistance, cooperation, and consideration for the interests of others. These are the hallmarks of the amateur spirit. Bill was a friend to many. One of the key people at his workplace mentioned that in 15 years she saw him get angry at someone only once—and that was well justified! His pleasant demeanor was a hallmark both in person and on the air. We can all learn from that. Bill gave of his time, especially in support of getting new microwavers on the air. He also shared operating strategy, site information, and even equipment with anyone who would ask.

Balanced . . . radio is an avocation, never interfering with duties owed to family, job, school, or community. Bill was exceedingly proud of his son Billy, who recently returned from Iraq. It was very nice to see his various operating awards posted in his den at his very nice home—the Tom Kirby award, a *QST* cover plaque, and many, many contest awards, among others. He cared deeply for his family, and we often cut short our technical visits so he could appropriately attend to family matters.

Patriotic . . . station and skill always ready for service to country and community. Bill was extremely supportive of our country! His job served the nation's defense, and he was always prepared to rove to anywhere he was needed in an emergency.

I miss Bill already. I last visited with him a couple of weeks ago at his home. He wanted to make sure that I correctly integrated a 903-MHz amplifier project that we had started a few months ago but never finished. That was Bill—doing whatever he could to get one more signal on the air!

73 Bill—I'm certain your new rover is the best one yet!

Concerning Jack, N3FZ, Bernd Mischlewski, DF2ZC, wrote the following tribute, which appeared on the Moon-net reflector: "Most probably don't yet know Jack, N3FZ, was another victim of cancer. His struggle ended peacefully last Sunday morning at 10:30 AM EST. Jack started EME on 2 meters with 300 watts and a single Yagi only some years ago, and I am very, very happy having worked him. I feel like I only spoke/wrote to him yesterday on the NØUK logger. Though we only met every now and then, I will miss this friendly, sympathetic, and always helpful fellow ham. Good bye, Jack!"

Hugh, WA6AUD, was an inspiration to all who read his musings, both via the "West Coast DX Bulletin" and via the "DX" column in *CQ*. I have more to say about Hugh at the end of this column.

Calls for Papers

Calls for papers are issued in advance of forthcoming conferences either for presenters to be speakers, or for papers to be published in the conferences' *Proceedings*, or both. For more information, questions about format, media, hardcopy, e-mail, etc., contact the person listed with the announcement. The following organization conference organizer has announced a call for papers for a forthcoming conference:

The **EME Conference 2006**: The EME Conference 2006 will be held in Wuerzburg, Germany, August 25–27. Interested authors are invited to present a paper(s). Electronic submissions in Word97, Word2000, Acrobat5 (PDF), or text format will be accepted by e-mail or CD. Please ask if you are using another format.

If you are interested in writing and/or presenting a paper, send an e-mail to Rainer Allraun, DF6NA, at: <df6na@df6na.de>. Please contact him as soon as possible with an abstract or even a general idea. This will help the conference team with its planning activities. For more information about the EME Conference 2006, see: <http://www. eme2006.com>.

Current Meteor Showers

Two showers occur this month. The first, the *Geminids,* is predicted to peak around 0224 UTC on 14 December. The actual peak can occur 2.5 hours before or after the predicted peak. It has a broad peak and is a good north-south shower, producing an average of 100– 110 meteors per hour at the peak.

The second, the *Ursids,* is predicted to peak around 1053 UTC on 22 December. It is an east-west shower, producing an average of greater than 12 meteors per hour, with the possibility of upwards of 90 at the peak.

For more information on the above meteor-shower predictions visit the International Meteor Organization's website: <http://www.imo.net>.

And Finally . . .

There are mentors and then there are mentors. In our hobby we call the mentors Elmers. We all can remember our Elmer(s), those who helped us through the hurdles of our early years in the hobby. Sometimes our Elmers are actively involved in our lives. Other Elmers play a more passive role, that of an unseen advisor. Some of these Elmers may not even know that they have served in that role in our lives.

Such was the case with Hugh Cassidy, WA6AUD, in my life. While we corresponded from time to time over the years, I probably barely registered on Hugh's radar screen. Even so, he was, and continues to be, a major Elmer to me.

I was most saddened to learn that he became a Silent Key this past September. Now not only is his key silent, but also his pen and his style of writing.

It was through his style that Hugh taught me the art of whimsical writing—a style that I don't get to use as much these days, because there is so much to report on in the wonderful world of VHF. More important, though, Hugh also taught me that there is so much goodness in our hobby—even if it is obscured from time to time. He challenged me to keep on looking for it.

One such time I felt that I needed to look for this goodness was nearly seven years ago when I was reading rather negative stuff about FM operators on the VHF reflector. It was in my reading of these postings that I drew upon my theology

of ham radio and Hugh's style to write the story below. It was first printed in my April 1999 column here in *CQ* and is reprinted as my tribute to Hugh:

The True Ham

One of my favorite reading pleasures used to be the stories invented by Hugh Cassidy, WA6AUD. Hugh published the "West Coast DX Bulletin" for a number of years and then retired from that endeavor, only to later take up, for a time, the editorship of this magazine's "DX" column.

I often thought that someday I, too, could invent bits of wisdom neatly wrapped in a story. Within this column, I am going to make an attempt.

Recent postings on the VHF reflector on the internet tend to have just a little bit of an anti-FM undertone. With that in mind, I want to present the following story.

It seems that there was a wise old ham who would occasionally be visited by newer, younger hams and asked for advice. On one occasion he was asked, "What are the characteristics of the true ham?" So he told this story, which had its originations in southern California:

It seems that one day there was a tremendous racket on 144.200 MHz. This racket occurred at different times during this particular day. It just happened one day and then it went away. Those listening on SSB knew right away what caused the sound. It was one of those FMers transmitting FM on the SSB calling frequency.

There were three or four hams in particular who responded to the sound, all of whom thought they were the ones who caused the problem to go away.

The first ham was an Extra class. He had a powerful station with big beam antennas. He decided to find the location of the offending sound by pointing his big antennas in the direction of it. When he found it, he turned on his linear and let the offender have it. After doing this about three or four times during the day, he noticed that the sound had gone away.

The second to respond was a group of hams who were just an ordinary bunch. They gathered on the calling frequency and chatted endlessly about nothing in particular. When the offending sound would come on, they would keep right on talking. Maybe someone would comment about the FMer, but generally they would ignore the sound and pretend that it wasn't there. Finally, at the end of the day, they noticed that it was gone. They reasoned to themselves that they were the ones to get rid of the sound by simply ignoring it.

The final person to respond was a relatively new ham. He had one of those licenses that so many people criticize, a code-free Technician. He had just bought a multi-mode radio. On this particular day he heard the same racket that everyone else did while he was listening to SSB on 144.200 MHz, only he did something different.

He switched his multi-mode radio to FM and listened. What he heard was a brand-new ham calling CQ. Well, this Technician realized immediately that the new ham had a problem. No one was going to answer him on FM on the SSB calling frequency.

He thought about making an exception and answering him, but decided against it because he figured that he would only compound the problem. So he did something else.

This Technician turned on his computer, checked into the World Wide Web, and looked up the callsign of the new ham. When he found the ham's address, he decided to get in his car and pay this new ham a visit.

When he arrived at the new ham's home, he knocked on the door and it was opened to him. After identifying himself to the new ham, he was invited in.

Both hams found instant friendship with each other. After a time the Technician asked to see the new ham's radio. The new ham brought out the radio, adding that he had purchased it at a swap meet the weekend before he received notice of his license.

Upon examination, the Technician realized that this was a radio that was a few years older than what was currently on the market. He then remembered that another southern California ham once wrote a review about the radio. In that review, the southern California ham chided the manufacturer of the radio for a flaw that caused the radio to default to 144.200 MHz upon initial power-up.

The Technician told the new ham about this flaw, adding that he had heard him during the day calling CQ with no results. After spending some time with the new ham explaining about the FM frequencies and repeaters and reprogramming the new ham's radio, the Technician left.

On the way back to his home, the Technician had a QSO with the new ham on one of the local repeaters. During the QSO he promised the new ham that he would be back to help him with other aspects of the hobby, such as finding a local club, setting up a fixed station, and so forth.

The wise old ham concluded his story by asking the question, "Which one of the three would be considered the true ham?" Those listening to him responded by saying that it was the Technician, to which the old man replied, "Go and do likewise."

Until next month...73 de Joe, N6CL

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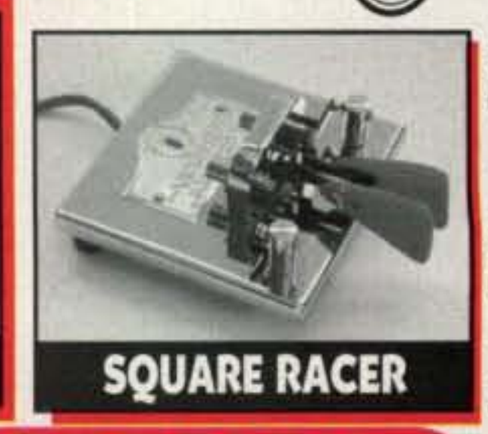
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beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Beware the Open Mic!

A few weeks ago I faced unusually light traffic and arrived at the office very early in the morning. In fact, I was so early that the office lights were still not turned on. Suddenly, my solitude was interrupted by a very private conversation someone was having behind a cubicle wall around the corner from my office (see photo 1). I was quite shocked to learn too many vivid details of this unknown cubicle neighbor's medical condition, but could not "turn it off" because her speakerphone was loud enough for me to hear both sides of the conversation.

In radio parlance, this is called an "open microphone" (open mic) situation—when everything being said on the microphone is being transmitted, no matter what. Another great example of this appears in a scene in the movie *Apollo 13,* when Commander James Lovell, played by Tom Hanks, loses his composure and (unintentionally) yells at Mission Control about the flight stability of his spacecraft. The communication system VOX (voice-activated transmit relay) was turned on.

Sometimes what is transmitted is harmless, but sometimes the transmissions may be harmful. However, in all cases, any unintentional transmission is at the very least embarrassing to anyone making the transmission, and very often equally embarrassing for the listener as well.

Photo 1– The ceilingless cubicle walls of modern office spaces provide a false sense of privacy to some people. Nothing is private, and everyone can hear what you are saying. The same is true of our ham radio conversations. Remember this every time you pick up your microphone and click the PTT (push-to-talk) switch.

The "Stuck" Microphone

This happens to all of us at one time or another, especially on repeaters during commuting times before and after work. Someone's mic switch is stuck in the "transmit" position and two things happen: (1) everyone on the repeater hears every sound from the "offender's" station and (2) no one else can use the repeater. Most of the time it is harmless, and sometimes it is funny, but it is always very irritating to others on frequency and locks up the repeater so no one else can get in with normal operations. However, there are at least three FCC Rule violations when this happens:

FCC Rule 97.113 (b), Prohibited Transmissions: Broadcasting prohibited. If the offending station is blasting "broadcast material" such as music or the news inside his or her vehicle, the open mic broadcasts this over the repeater.

FCC Rule 97.105 (a), Control Operator Duties. Since the stuck microphone means an uncontrolled transmission is in progress, there is no responsible licensee present to monitor or correct the situation.

FCC Rule 97.119, Station Identification. The stuck microphone cannot identify the station all by itself, so this is another violation of the rules.

Remember, there is no way for you to pick up your microphone to tell the offending station that his/her microphone is stuck, since most VHF-FM radios run "half duplex." This means that when transmitting, receiving is locked out. On some repeater systems other bands are linked, so it may be possible to let an offending station know this is happening, and then it can be corrected. Also, a lot of the current multi-band transceivers have the capability of listening to multiple bands at the same time, so if you know the offending station, you may be able to contact him/her so this can be corrected.

I find it somewhat funny to hear this stuck-microphone mystery unravel. It usually goes like this:

It is 7:45 in the morning, and the usual suspect (the names and calls are deleted here to protect the innocent as well as the guilty) is driving along the freeway to work. Thankfully, the broadcast radio is either off or turned down so that the ham rig is not picking up the audio. Along *with a cup* of fancy coffee in the vehicle cup holder is the multi-function microphone for the mobile radio tuned to our wide-coverage club repeater (see photo 2). We hear the cell phone ring and one side of a conversation with the suspect's wife. We already know the kitchen remodeling project is behind, and now she wants

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some major changes to the project, extending once more the already delayed schedule.

Since we have confirmed the suspect's identity based on the cell-phone conversation, and the call is completed, someone calls the offending station on his cell phone. We even hear it ring over the repeater. We can hear the offending station answer the phone, and from his side of the conversation we confirm that the caller is one of our fellow club members asking the offending station to check his mobile rig. The offending station mumbles something, ends the call, and as if by magic, the stuck microphone radio goes quiet.

Normal repeater operation is restored, and of course everyone in the "audience" gets a chance to give our offending station the heckling he deserves.

I guess this is a good example of what the FCC calls a "self-policing service."

VOX and Anti-VOX

This variation of the stuck microphone usually happens on the HF bands, where most modern (and even not-so-modern) radios have a feature called "VOX," or voice-activated transmit. It is very convenient and enables hands-free operation. It is very handy when you need to keep a running log or record of activity on the radio—in contesting, traffic-handling, or public-service work, for example. If you do choose to use VOX, make sure you adjust it correctly.

Remember to turn the transmit power down and use a dummy load (a big 50-ohm resistor used to simulate an antenna) to prevent interference to other stations when making any transmitter adjustments. There are usually three adjustments to make when using VOX mode.

VOX gain is used to adjust the sensitivity of the trigger circuit when you speak into the microphone. For proper adjustment just talk into the microphone with your "normal speaking voice." You should not yell or whisper when making this adjustment. Adjust the control so that the rig goes into transmit as you speak into the microphone.

VOX delay adjusts the time between transmit and receive, or the pause between sentences. The delay should be adjusted so that a "natural" receive/transmit sequence is achieved. In other words, adjust the delay control so that the rig goes into transmit and holds (the delay) while you finish a sentence. The VOX should not switch from transmit to receive between syllables or words. Say a sentence and pause slightly, and then speak your second phrase. By the way, it is considered poor operating style to hum or say "ahhhh" to compensate for a poorly adjusted VOX delay.

The **anti-VOX** control is used to prevent false triggering and usually happens when the speaker output (receiver audio) triggers the transmit relay. You can immediately tell when your anti-VOX is incorrectly adjusted, because your rig will click from receive to transmit all by itself or will rapidly bounce back and forth from transmit to receive. When this happens, adjust the anti-VOX until the rig "calms down."

The VOX feature can be a huge asset, but it is not suitable when there is lots of ambient noise or intermittent noise around the station. For example, if your rig is set up next to your child's room, it might not be a good idea to "share" her crying with others on frequency, especially if it interferes with clear transmissions from your station. On the other hand, if you are running a phone patch or providing other third-party traffic for a relative or something, it may not of-

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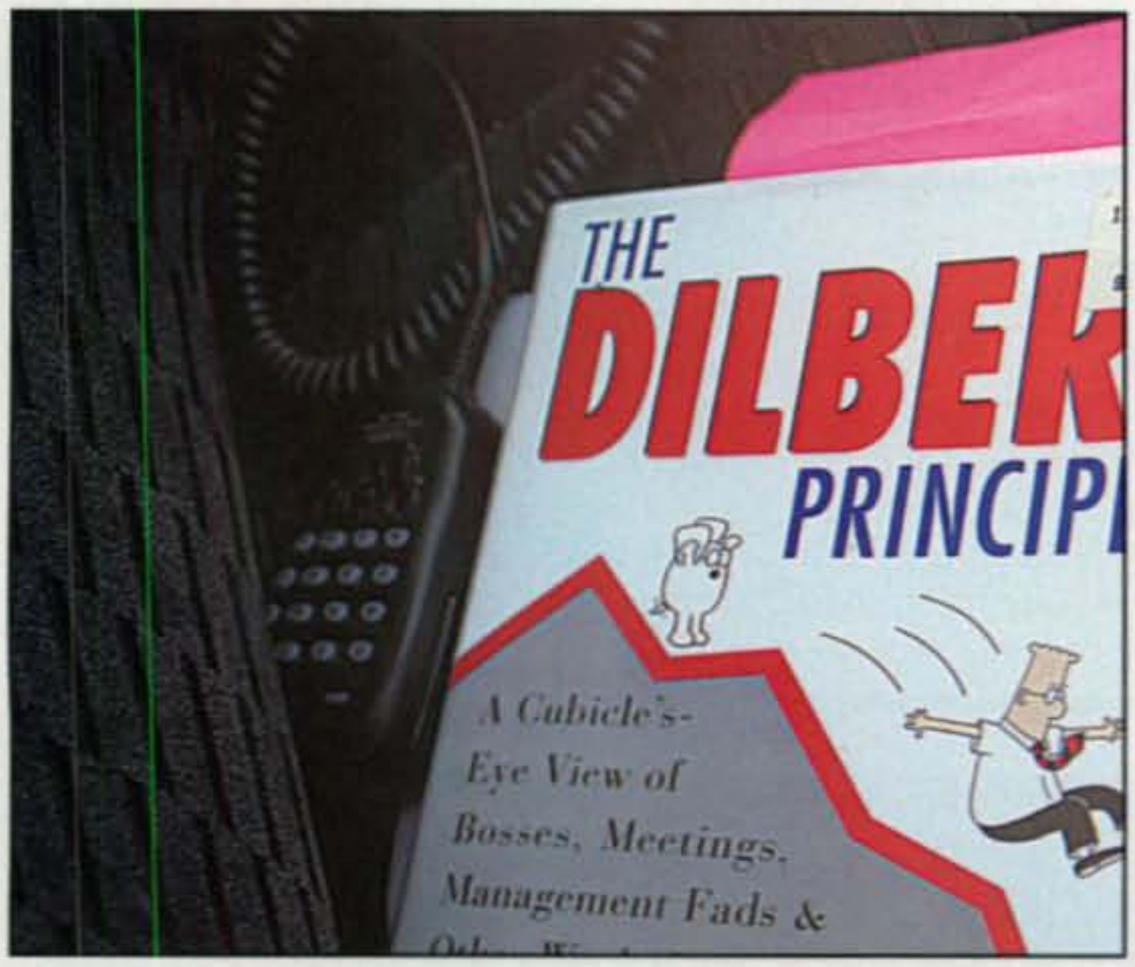

Photo 2– Never put down your mobile microphone or put it in a place where the PTT button can accidentally be locked into transmit. One example is shown here, when you put the mic on the front seat and it wedges against something. People can say the strangest things to themselves or at other drivers when they are all alone.

Photo 3– A footswitch is a great asset in contesting, traffic-handling, and public-service work, since it enables hands-free operation without allowing too much "garbage audio" to be transmitted from your station.

fend but may enhance the conversation with the other party. However, this would be an exception rather than a rule. The same is true when you are providing public-service communications at a parade and you get an assignment right next to a public-address speaker or the band. If you have VOX enabled, all the unwanted audio "garbage" will get into the communications net and cause irritating interference to others listening to the frequency.

In this case, you should switch to manual push-to-talk (PTT). In other words, use either a hand-held microphone or a "desk" microphone. If you need hands-free operation in a noisy environment, then use a footswitch (see photo 3). This gives you the advantage of hands-free operation without falsely triggering the transmitter.

We must always remember this open-mic situation every time we click the PTT button and say something. Try to think first about what you are saying, because hurtful things—even those transmitted unintentionally—can never be taken back.

Let's try to keep this from happening and increase our radio enjoyment by making sure that our radios are in "transmit" only when we want them to be.

73, Wayne, KH6WZ

References and Resources

The 1995 movie *Apollo 13*, directed by Ron Howard and starring Tom Hanks, has a great scene about the dangers of an "open mic situation." Some nice clips from the movie are posted at: <http://movieweb.com/movies/film.php?1293>.

The 1999 movie *Office Space*, directed by Mike Judge and starring Ron Livingston and Jennifer Aniston, gives you some humorous insight into the modern cubicle office environment. Do an internet seach on "Office Space Movie Fan Site."

Headsets, microphones, and footswitches are available from Heil Sound <http://www.heilsound.com> and other sources. Footswitches may also be found at guitar shops and surplus-electronics stores. Check with your favorite ham radio dealer and the ads in *CQ* for more sources.

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BY TED MELINOSKY,* K1BV

Some Common Award Hunting Abbreviations and Terms

Every area of amateur radio has its share of abbreviations, and award collecting is no exception. Here are some of the common ones, starting with the one which raises the most questions:

GCR—General Certification Rule: In this case, the award sponsor is saying that it does not want you to send the actual cards. Just include a statement on the application that you have the cards in your possession and that two witnesses (licensed amateurs) have personally viewed them. Only a very few "high profile" awards such as DXCC and WAZ require you to bundle up and ship the cards. This rule, which dates back at least to the 1960s, tends to make life a lot simpler.

SASE—Self-Addressed Stamped Envelope: You should enclose such an envelope of certificate size with enough postage to allow the custodian to return the award to you with a minimum amount of work and expense.

IRC—International Reply Coupon: Available from the post office or from some QSL managers, IRCs are issued by the Universal Postal Union in Geneva to all member countries. They allow you to receive an airmail postage stamp at your local post office. These coupons act as an international currency for hams wishing to get awards from foreign countries without the bother and expense of obtaining and mailing small amounts of local currency. *Problems:* Not all postal clerks are familiar with IRCs, and if the coupon is stamped on the right-hand side, it cannot be redeemed.

Jolly Station: This term usually refers to a "wild card" station which will act as a substitute for another required contact or for additional point value for the award.

ARC (ARS)—Amateur Radio Club (Amateur Radio Society): That one is self-explanatory!

SWL OK: SWLs may apply for this award on the same basis as amateurs. Nearly all awards are equally available to SWLs, even if this statement does not appear in the award rules.

No Repeaters: Contacts made using repeaters may not be used for the award.

DX Awards

Cantons of Belgium Award. As an award hunter, you're probably aware that Belgium, like many European countries, is broken down into provinces—11 of them, to be exact. There's even a smaller unit of local government called a *canton,* which is less well known. This award is probably for the advanced QSL collector. Your ON prefix pile of QSL cards should be a couple of inches (or more) thick. You also should probably count on being active in the Belgian contests for the next few years. If you enjoy a challenge, go for it!

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Honor Roll

1500		2000	
K6CA	1424	K6CA	1318

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

The award is sponsored by the Radio Club of Lessines to encourage contacts with the cantons of Belgium on or after 1 January 2000. SWL OK.

As of 1 January 2003, there are 208 cantons in Belgium, and they are broken down by province as follows:

Province	Abbreviation	# of Cantons
Antwerpen	AN	17
Bruxelles-Capitale	BX	8
Brabant Wallon	BW	5
Hainaut	HT	32
Limbourg	LB	15
Liège	LG	26
Luxembourg	LX	20
Namur	NM	14
Oost Vlaanderen	OV	32
Vlaamse Brabant	VB	14
West-Vlaanderen	WV	25

A list of the cantons may be found at the club's website (see below). The cantons are identified in a special format where the first two characters are the province abbreviation and the last two digits are the canton number (for example, HT-09 represents Hainaut province and Lessines canton). Cantons

The Silver Cantons of Belgium Award. The award series is sponsored by the Radio Club of Lessines. Cantons are a unit of government in Belgium (and other European countries) smaller than provinces.

Cantons of Belgium Award

Bronze Award

ON need 30 different cantons, other EU need 20, all others 10.

	Cantons Needed	Minimum No. of Cantons for these Cantons: VB, BX, BW	Minimum No. of Cantons for the other Provinces
Silver Award			
Belgian stations	60	5	5
European	40	3	3
All others	20	1	1
Gold Award			
Belgian stations	120	10	10
European	80	7	7
All others	40	3	3
Platinum Award			
Belgian stations	208	All	All
European	160	10	10
All others	80	7	7

Table I– Requirements for the various levels of the Cantons of Belgium Award.

The G-8 Award is issued for working the top eight industrialized countries of the world and is sponsored by the Cleddau ARS of England.

The Fathers of Radio Award

Country	Prefix	Inventors/Scientists
Canada	VE	Reginald Fessenden
Croatia	9A	Nikola Tesla
Denmark	OZ	Hans Christian Orsted
France	F	Edouard Branly
Germany	DF, DK, DL, DM	Heinrich Rudolf Hertz Karl Ferdinand Braun Adolf Slaby
India	VU	Jagdish Chandra Bose
England	G, M	Michael Faraday Oliver Lodge
Italy	I	Guglielmo Marconi Augusto Righi Temistocle Calzecchi Onesti Luigi Galvani
Russia	RA–RZ, UA–UZ	Aleksandr Popov
Scotland	GM	James Clerk Maxwell
USA	A, K, N, W	Samuel Morse David E. Hughes Lee De Forest Nathan Stubblefield

Table II– Make contacts with the following countries, where early inventors and scientists lived, to earn The Fathers of Radio Award, sponsored by the Sala Consilina section of the ARI (Italy).

may be identified on a QSL card, or by the postal code and name of the city printed on the card. If the card has none of these identifiers, it is not valid for the award. Portable or mobile stations are valid for the award only if they have sufficient information to identify the canton.

There are four categories of the award: bronze, silver, gold, and platinum. The bronze, silver, and gold awards are paper certificates. The platinum award is a plate made of tin and walnut. See Table I for the various award requirements.

The award may be earned using HF or VHF contacts, but not mixed using HF *and* VHF. All modes OK. Endorsements for single mode or mixed. No use of repeaters. Contest QSOs OK. Belgian stations must submit cards. GCR accepted for all others, although photocopies of cards may be sent. For the bronze, silver, or gold levels, the fee for European stations is 10 Euros and 2 IRCs. For all others, the fee is 10 Euros, or $US11, and 3 IRCs. The fee for the platinum-level plaque is 25 Euros plus 4 IRCs for all Europeans and 25 Euros, or $US27, plus 6 IRCs. Apply to: Daniel Vandewalle, ON7VZ, Mazenque 25, B-7866 Ollignies, Belgium. Internet: <http://ibelgique.ifrance.com/ dcb_dho/>.

England's Annual "G-8" Award. The Cleddau ARS sponsors an interesting series of awards, one of which requires

Shari Bird, KBØMHH, USA-CA All Counties #1121

I received my first ham radio license back on March 29, 1994 as a Technician. About the same time my husband, Brian, NXØX, and my father-in-law, Cliff, ACØB, upgraded to Extra. I laugh thinking back on how different our radio hobby is today compared to 11 years ago when I was first licensed. I was in the *cold* basement with my 2-meter handheld radio, a KPC-3, and a computer sending packet back and forth to other stations in the U.S. and around the world (my first DX packet contact was with GØMDW). My husband (Brian was NØYTZ at the time) was upstairs in the bedroom on his HF radio working stations from all over the world. Today Brian and I share the same radio room with more radios than I'll ever know what to do with, since Brian is a Drake radio collector.

I started to study for the general written exam and worked hard learning the code (that dreadful code scares me). Brian would help me by sending code characters and I would tell him what he sent. Finally, in February 1995, I took my general test with code and passed, to my surprise. Several years passed, and then both Brian and Cliff encouraged me to upgrade to Extra. So I decided once again to study and upgrade. On may 14, 2002 I took the Extra test while our 11-year-old daughter took her Technician test. As the examiner came over to Ashley and me, he told me I had passed and then, "Sorry to tell you, Ashley . . ." and he paused, as my heart just sank, "but you passed also!" I'm not sure who had been more nervous, she or I. As we drove home we both were very excited and couldn't wait to tell everyone the news. About six weeks later she was granted KCØNGZ and soon changed her call to KØUMD (University of Minnesota, Duluth). My nephew Jesse watched Brian and me on the radio, which piqued his interest in our hobby and he is now KCØOLK. I need to thank my dear father-in-law ACØB for his time in making a computer study guide and for his encouragement of both Ashley and me. Thanks!

I started to collect counties back in 1996, when I stumbled across the County Hunters Net. I listened for a bit, and then made my first contact on may 28, 1996, with AA6MR in Big Horn, Wyoming. I told Brian about the net and he too made a contact. We were hooked, making contacts just about every day after that until I decided it was time for me to go back to work in the real world and my county hunting then took a back seat.

Shari Bird, KBØMHH, USA-CA All Counties #1121, May 12, 2005.

Brian tried to stay active in county hunting and get his dad active in it as well. Brian likes to tell me if I hadn't gone back to work, I could have finished long ago. Well, nine years later I am a stay-at-home mom again and I finally finished my USA-CA.

Along my county hunting adventure I have met some great "new" friends: WQ7A (Terry, and his wife Boni), KM9X and KB9MGI (Dan and judy), and many others. The list could go on and on. I need to say thanks to Darrell Davis, KCØRCX, in Kansas, Dave, W4YDY, and Carol, AB2LS, for their help in getting me my last couple of counties, as well as to all the other mobiles who helped me by going cross-country, logging many miles, and doing something they all love to do and I hope to do more of—put out counties.

Now, on May 12, 2005, just about nine years after making my first contact on the CHN, I have completed the "whole ball of wax." thank to my husband Brian for running to Talbot, Maryland on his 39th birthday to let me finish. What a present for both of us! Now Brian, Cliff, and I all have a "star."

In my free time I chase 10-10 numbers and work some DX (I just confirmed my 103rd contact for my DXCC award (all SSB, of course). From time to time Brian and I like to work on the 3905 Century Club nets as a combo (we both are still working the awards) and I stay very active with our daughters Ashley and Megan.

—73/88 Shari, KBØMHH

working each of the G-8 countries during the annual term of its rotating presidency. (These are the eight industrialized countries whose meetings generally attract demonstrations.) For 2005, England acted as president, and the certificate features full-color flags of each member country, plus a larger image of the Union Jack. (Next year's president will be Russia.)

Work all G8 countries (Canada, France, Germany, Italy, Japan, Russia, the United States, and the United Kingdom) in one calendar year. All funds raised from the award go towards the maintenance of GB3AE, the only 6-meter repeater in Wales. Send GCR list and fee of £4, $US8, 7 Euros, or 12 IRCs to: Award Manager John Rees GWØJRF, Caerleon, Picton Road, Tenby, Pembrokeshire, SA70 7DP, United Kingdom. Internet: <http://www.cleddau-ars.org.uk> and <http://www.g-eight-award.co.uk>.

Italy's The Fathers of Radio Award. The Sala Consilina (SA) section of the ARI sponsors this award in honor of those scientists and experimenters who

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The Fathers of Radio Award honors those early scientists and experimenters who contributed to the invention and development of radio.

Contact five DXpeditions on at least three islands of the Ukraine to earn the Ukraine Islands Award.

predicted the possibility of sending information through the air and then developed the first equipment to do this. You'll see some very familiar names on the list (see Table II), as well as some you may be seeing for the first time. All participated in the invention and early development of communications technology, which during the time just before World War I to the 1930s was just as exciting as the 1990s, with the advent of the internet, were to us.

The award is available to all amateurs and SWLs for having worked or heard all the 11 countries where these scientists and inventors lived and worked. All bands and modes. The three categories of the award are:

HF—contact all 11 countries.

50-MHz/VHF/UHF—contact 6 countries.

Satellite—contact 6 countries.

QSL cards are not required, but they must be in possession of the applicant and could be requested anytime for checking. Send GCR list and fee of 10 Euros or $US12 . To receive the award by registered mail, add 3 Euros, or $US4. Apply to: ARI Sezione Sala Consilina, Casella Postale N.11. CAP, 84036 Sala Consilina (SA), Italy.

Ukraine Islands Award. The Ukraine DX-Peditions Foundation offers this award for contacting stations that operate on Ukraine islands. Most of this activity probably occurs during the summer months, and your QSL collection may have a few of these from recent years. I'd suggest checking cards in the EM, EN, and EO prefix series, since many Ukraine expeditions seem to use these groupings. The award has been available for about five years. If you're like me and jump into any pile-up that has an unusual prefix, and you may be in luck.

The certificate is awarded for making contact with five DXpeditions on at least three different islands of the Ukraine. All bands and modes. SWL OK. Only one QSO with each expedition is valid for the award. Endorsements for 10, 15, 20/Honor, and 25/Top Honor are available. Send GCR list and fee of 5 IRCs (or $US3) for the award to: UDXPF Hq, George Chlijanc UY5XE, P.O. Box 19, Lviv 79000, Ukraine (e-mail: <uy5xe@ut1wpr.ampr.org>). Internet: <http://www.qsl.net/uy5xe/index.html>.

Looking for award publicity? *CQ* magazine is the only U.S. amateur magazine with a monthly awards column. We can help you get the publicity that is so important for a vital program. Send me the details, including rules and a sample certificate, and let's see what can be done to put the rules in front of thousands of *CQ* readers. 73,Ted, K1BV

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BY CARL SMITH,* N4AA

NCDXF/IARU Beacons

We'll be in the midst of the 2005 holiday season by the time you read this. We already will have been through the CQ WW SSB Contest and will be looking forward to the CW contest. Since I have no idea what propagation will be like on either weekend, I'll just have to say "good luck to all" and I hope you work a lot of new ones.

The Christmas and New Year's holidays are just ahead of us, and I'll take this opportunity to wish each of you a joyous holiday season and the very best for the coming year. If you believe what you read, the end of 2006 will bring us to the bottom of the current solar cycle. I, for one, will be glad to see some improvement in conditions after that . . . in fact, *any* improvement. However, we all know it takes years for the cycle to bring back the great band openings on the higher frequency bands. You remember . . . when the signals on 10 meters are S9-plus from everywhere and the band stays open late into the evening for us here in the U.S. Ah, the memories!

NCDXF/IARU Beacons

Do you use the beacon system? Do you even know what it is? A lot of DXers do use it, yet I find that a lot of DXers don't have any idea what it is or how to find it. I'll give you the bare-bones details here, and hopefully you will follow up on your own.

*P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>

The CYØAA team—Joe, W8GEX; Lee, K8LEE; and Phil, W9IXX—with their life jackets ready to board the plane taking them to Sable Island. (Photo courtesy of Phil, W9IXX)

Here's the story from the Northern California DX Foundation's website, <www.ncdxf.org>:

The NCDXF, in cooperation with the IARU, constructed and operates a worldwide network of high-frequency radio beacons on 14.100, 18.110, 21.150, 24.930, and 28.200 megaHertz. These beacons help both amateur and commercial high-frequency radio users assess the current condition of the ionosphere. The entire system is designed, built, and operated by volunteers at no cost except for the actual price of hardware components, shipping costs, and so on.

In principle, one can simply listen on the beacon fre-

NCDXF/IARU Beacon Transmission Schedule

Call	Location	14.100	18.110	21.150	24.930	28.200	Operator	Status
4U1UN	United Nations	00:00	00:10	00:20	00:30	00:40	UNRC	OK
VE8AT	Canada	00:10	00:20	00:30	00:40	00:50	RAC/NARC	OK[1]
W6WX	United States	00:20	00:30	00:40	00:50	01:00	NCDXF	OK
KH6WO	Hawaii	00:30	00:40	00:50	01:00	01:10	KH6BYU	OK[3]
ZL6B	New Zealand	00:40	00:50	01:00	01:10	01:20	NZART	OK
VK6RBP	Australia	00:50	01:00	01:10	01:20	01:30	WIA	OK
JA2IGY	Japan	01:00	01:10	01:20	01:30	01:40	JARL	OK
RR9O	Russia	01:10	01:20	01:30	01:40	01:50	SRR	OK
VR2B	Hong Kong	01:20	01:30	01:40	01:50	02:00	HARTS	OFF[5]
4S7B	Sri Lanka	01:30	01:40	01:50	02:00	02:10	RSSL	OK
ZS6DN	South Africa	01:40	01:50	02:00	02:10	02:20	ZS6DN	OK
5Z4B	Kenya	01:50	02:00	02:10	02:20	02:30	ARSK	OK[1]
4X6TU	Israel	02:00	02:10	02:20	02:30	02:40	IARC	OK
OH2B	Finland	02:10	02:20	02:30	02:40	02:50	SRAL	OK
CS3B	Madeira	02:20	02:30	02:40	02:50	00:00	ARRM	OK
LU4AA	Argentina	02:30	02:40	02:50	00:00	00:10	RCA	OK
OA4B	Peru	02:40	02:50	00:00	00:10	00:20	RCP	OK[4]
YV5B	Venezuela	02:50	00:00	00:10	00:20	00:30	RCV	OK

Notes:
1. Operation may be intermittent due to local conditions.
2. Damage to the transmitter is being repaired.
3. Operation on the WARC bands began October 6, 2005.
4. Beacon is operating from a temporary location in Lima.
5. Beacon was struck by lightning May 22, 2005. Repairs are being made.

The originators of the SEDCO Convention: George, W4UWC; Rosie, KA4S; and Lynn, W4NL. (Photo courtesy of Lynn, W4NL)

Bill, W9VA (left) presents a check to Tim, N4GN, from the raffle at the W9-DXCC Convention. Proceeds go to the Northern California DX Foundation. (Photo courtesy of Paula, K9IR)

quencies and copy the CW callsigns of the various beacons to figure out where the band is open; but in practice, not every ham operator can copy calls at 22 words per minute, and some beacons may be heard at too low a signal strength to catch the call. Because the beacons transmit at known times, it is easy to know which beacon one is hearing without actually copying the CW callsign. Since the beacons are running 100 watts to a vertical, even a weak beacon signal may indicate a path with excellent propagation for stations using higher power and directive antennas.

NCDXF/IARU Beacon Transmission Schedule. Each beacon transmits every three minutes, day and night. The table gives the minute and second of the start of the first transmission within the hour for each beacon on each frequency. A transmission consists of the callsign of the beacon sent at 22 words per minute followed by four 1-second dashes. The callsign and the first dash are sent at 100 watts. The remaining dashes are sent at 10 watts, 1 watt, and 100 milliwatts. Click the callsign to see recent reception reports via DX Summit. If you can hear a beacon now, send a report to DX Summit.

It is interesting to sit and listen to one of the frequencies and see what beacons you are able to hear from around the world. Give it a try!

DXpedition News

I hope that by the time you read this we will have had a chance to work the French team on Glorioso. They are hoping to make the trip in late November, before the hurricane season in that part of the world.

Most DXers are anxiously awaiting the early 2006 DXpedition to Peter I. The team has planned, practiced, and planned some more for this long-delayed trip. I wish them God Speed

The WPX Program

SSB

2944 .....TA3YJ 2945 .....TA3J

CW

3160 .....DL1HTX 3161 .....I3FIY

Mixed

1957 .....KB8MCZ 1959.....TA3YJ
1958 .....W9HR 1960 .....TA3J

CW: 400 DL1NTX. 1150 DL3HSC. 2000 JA1XCZ. 2100 VE6BF.
SSB: 500 TA3YJ. 800 SV1EOS, VE6BF.
Mixed: 500 TA3YJ. 800 W9HR. 1350 TA3J. 2000 KØKG. 2150 JA6GWU. 2250 VE6BF.

10 Meters: SV1EOS

15 Meters: EC1ARM, SV1EOS

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MDD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, WB8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8UB, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IK4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBF, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, I7PXV, S53EO, DF7GK, S57J, EA5BM, DL1EY, DJ1YH, KUØA, VE2UW, 9A9R, UAØFZ, DJ3JSW, OE6CLE, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, KT2C.

160 Meter Endorsements: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8ILC, K9BG, W1CU, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, DJ1YH, KUØA, VR2UW, UAØFZ, DJ3JSW, OE6CLD, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, CT4NH, EA7TV, LY3BA, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA. *Note: WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.*

Please Note: As of February 2004, the price of the 160 meter bar for the Award of Excellence is now $6.50.

CQ DX Awards Program

SSB

2469 .....G4ZUL 2471 .....WA5UA
2470.....KT2C 2472.....N2VRA

CW

1075.....KT2C

SSB Endorsements

320 .....I4LCK/335 300.....WØROB/307
320 .....KE4SCY/323 200.....CT2FUH/211
310 .....XE2NLD/315 200.....KT2C/204
310 .....RW9SG/310 150 .....WA5UA/157

CW Endorsements

320.....I4LCK/334 320 .....KA3S/327
320.....K4JLD/331 300 .....KT2C/300

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 335 active countries. Please make all checks payable to the award manager.

5 Band WAZ

As of October 1, 2005, 682 stations have attained the 200 zone level and 1468 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:

UT5UT

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
IK1AOD, 199 (1)
DF3CB, 199 (1)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
W1JZ, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
SP5DVP, 199 (31 on 40)
W8AEF, 199 (40)
K8RR, 199 (26)
UU5JR, 199 (4)
W8GF, 199 (22)
N4NX, 199 (26)
N4MM, 199 (26)
EA7GF, 199 (1)
WAØQII, 199 (26)
N4PQX, 199 (26)
JA5IU, 199 (2)
N6HR/7, 199 (37)
CT3DL, 199 (26)
NØIJ, 199 (21)
RU3DX, 199 (6)
N4XR, 199 (22)
WØPGI, 199 (26)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K5PC, 198 (18, 23)
K4CN, 198 (23, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
OE2LCM, 198 (1, 31)
HA1RW, 198 (1, 31)
WK3N, 198 (23, 24)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
RX9TX, 198 (2, 6)
F5NBU, 198 (19, 31)

The following have qualified for the basic 5 Band WAZ Award:

N4TV (183 zones)
NQ7R (170 zones)
JT1BV (152 zones)
N9RS (193 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

The WAZ Program

10 Meter SSB

574 ..... JE1LFX

12 Meter SSB

38 ..... EA8AYV

15 Meter SSB

621 ..... JR1GSE
622 ..... JM1GHT
623 ..... K8AJK

17 Meter SSB

40 ..... S54E

20 Meter CW

554 ..... JE1LFX

80 Meter CW

68 ..... SP8FHM

6 Meters

73 ..... JF6EZY
74 ..... VE1YX

160 Meters

213 ..... HB9BGV
214 ..... UXØUN

All Band WAZ SSB

4972 ..... CU2AP
4973 ..... N6HY

Mixed

8374 ..... UT5UT
8375 ..... SV1CQN
8376 ..... N6HY
8377 ..... JA1ASR
8378 ..... JK1FNL
8379 ..... KA2VHY
8380 ..... DAØBCC

All CW

469 ..... JH1QDF
470 ..... N6HY

RTTY

161 ..... S54E

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

and a safe journey as they do their best to put this very rare spot on the air.

The Kure Atoll DXpedition ended in early October with over 52,000 QSOs in the logs. The preliminary statistics showed slightly more CW Qs than SSB (27K vs. 22K), with another nearly 2K on RTTY. As you might expect, 20 meters was the hottest band, with nearly 30% of the total Qs being on that band. Somewhat surprising was the number two band—17 meters with 18% of the total—followed by 40 meters with nearly 14% and then 15 meters with 12%. The 160-meter gang managed to pull out 1288 Qs, and even 80 showed over 4900. Overall, it was a pretty good showing from a rare one for the down side of the sunspot cycle. Thanks guys and gals. We appreciate your efforts.

DX Conventions

A couple of DX conventions took place in late September and early October. The 53rd annual W9-DXCC Convention in Chicago was a great event. I was finally able to make it up there this year, after being "stuck" with no transportation last year due to the hurricanes of 2004 closing down the airports. The W9-DXCC Convention committee does an outstanding job, and it's really fun to be there.

The other convention was a first-time event called SEDCO, held in Pigeon Forge, Tennessee. It was intentionally scheduled to go along with the annual Ten-Tec Factory Hamfest. Nearly 100 DXers and contesters attended this inaugural event and had a fantastic time. Lynn, W4NL, and his wife Rosie, KA4S, along with George, W4UWC, put

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Power Rating--1.5 Kw PEP
Typical SWR--1.5 or less
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THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

MIXED

5235 9A2AA	3900 VE3XN	3423 S53EO	3011 W2WC	2620 K2XF	2142 I2EAY	1705 W2EZ	1016 RA1AOB
4778 W2FXA	3968 YU1AB	3332 WB2YQH	2896 W9OP	2518 OZ1ACB	2100 VE6BF	1643 N1KC	825 KL7FAP
4257 W1CU	3914 I2PJA	3325 KØDEQ	2873 W2MF	2457 JN3SAC	1804 KØKG	1560 KX1A	742 K5IC
4241 EA2IA	3703 I2UIY	3292 YU7BCD	2800 9A4W	2426 W6OUL	1773 W7CB	1556 W2OO	648 KWØH
4111 N4NO	3520 I2MQP	3262 IK2ILH	2705 W9IL	2399 K5UR	1741 AB5C	1242 K6UXO	

SSB

4616 IØZV	3292 EA2IA	2734 OE2EGL	2326 CX6BZ	2076 K2XF	1716 W6OUL	1480 AB5C	1215 W3LL	807 IK8OZP
4239 VE1YX	3225 N4NO	2711 LU8ESU	2235 NQ3A	2075 N6FX	1716 W2FKF	1458 JN3SAC	1202 AG4W	761 SV1EOS
3891 I2PJA	3155 I2UIY	2609 KF7RU	2227 YU7BCD	2038 K5UR	1615 KI7AO	1386 IK4HPU	1145 EA3EQT	674 K7SAM
3765 F6DZU	3142 CT1AHU	2595 EA1JG	2209 IK2QPR	1993 W9IL	1611 W2ME	1340 I2EAY	978 EA7HY	668 AE9DX
3424 OZ5EV	3016 I4CSP	2479 IN3QCT	2196 W2WC	1830 K3IXD	1591 SV3AQR	1258 N1KC	934 KX1A	
3365 I2MQP	2857 4X6DK	2431 G4UOL	2082 I3ZSX	1719 KQ8D	1580 DL8AAV	1256 VE7SMP	851 KU4BP	

CW

4471 WA2HZR	3294 EA2IA	2477 KA7T	2348 I7PXV	2093 IK3GER	1907 W9IL	1744 EA7AAW	1227 K6UXO
4229 K9QVB	3094 LZ1XL	2476 W2WC	2213 OZ5UR	2089 K2XF	1863 W6OUL	1362 AC5K	1171 WA2VQV
3674 N4NO	2688 I2UIY	2437 EA7AZA	2167 N6FX	1958 VE6BF	1821 I2MQP	1352 WO3Z	1048 KX1A
3339 VE7DP	2632 W2ME	2401 YU7BCD	2120 JN3SAC	1939 K5UR	1767 I2EAY	1334 RUØLL	915 N1KC

SEDCO together. I had the honor of being the emcee for the DX portion of the weekend, with Ted, W4NZ, handling the contest portion. Lynn has put together a very nice website with pictures and more. Take a look at <www.sedco.homestead.com> and see who was there. The event was so well received that plans have already begun for a repeat next year at the same Mainstay Suites location, again in conjunction with the Tec-Tec Hamfest. Put this one on your calendar and join us for a great weekend of fun and fellowship—or as Lynn says, "hamship."

Most Wanted Survey

The annual Most Wanted Survey conducted by *The DX Magazine* closed on October 15th. An excellent response was noted from all areas of the world. Roger Western, G3SXW, and Tim Kirby, G4VXE, will be working up the final analysis for the top 100 Most Wanted for publication in the January/February issue of *The DX Magazine*. A further breakdown by mode will then be published in the March/April issue. The over-

CQ DX Field Award Honor Roll

The CQ DX Field Award Honor Roll recognizes those DXers who have submitted proof of confirmation with 175 or more grid fields. Honor Roll lisiting is automatic upon approval of an application for 175 or more grid fields. To remain on the CQ DX Field Award Honor Roll, annual updates are required. Updates must be accompanied by an SASE if confirmation is desired. The fee for endorsement stickers is $1.00 each plus SASE. Please make all checks payable to the Award Manager, Billy F. Williams. Mail all updates to P.O. Box 9673, Jacksonville, FL 32208.

Mixed

K2TQC 225	BA4DW 188	W5ODD 177
VE3XN 217	W4UM 183	N2AU 177
HAØDU 217	F6HMJ 182	NØFW 176
KØDEQ 207	K2SHZ 182	N8PR 175
JN3SAC 194	N4NX 182	ON4CAS 175
N4MM 194	KØCA 181	K8OOK 175

SSB

VE7SMP 182	W4ABW 177	N4MM 176
KØDEQ 180	NØFW 176	

CW

KØDEQ 198	KØCA 175
JN3SAC 181	N4MM 175

K9PPY (center) wins the ICOM 746 at the W9-DXCC raffle. (Photo courtesy of Paula, K9IR)

The annual "passing of the hog" at the W9-DXCC Convention finds K9UQN on the right conveying the "honor" to K9RJ (left). (Photo courtesy of Paula, K9IR)

QSL Information

ØT7Ø5G via EA7FTR
ØT8Ø5P via EA7FTR
3A/SP2JMB via SP2PI
3G1M via XQ1IDM
4F3CV via HB9CXZ
4M5R via EA5KB
4N15ARDF via YU1SRS
4XØAI via 4Z4DX
5B/HA5PP via HA5PP
5H2AG via EA5RM
7XØRY via OK1DYW
8P2K via KU9C
8P6SH via KU9C
9A/ON4TX via ON4TX
9HØVRZ via PB9ZR
9H3AAG via PA1XA
9H3HS via PE2HSB
9H3IE via PAØBEA
9H3MIR via PAØMIR
9H3ON via PG9W
9H3XQ via PAØCKV
9H3XYL via PAØXYL
9H3ZR via PB9ZR
9M2/PF5X via PAØKHS
9M6DXX via 9M6DXX
9R2CV via I2YDX
9R2DX via I2YDX
ALØ/K4XS via K4XS
C21SX via G3SXW
C21XF via G3TXF
CK6AO via VE6AO
CT/ON4LO/P via ON4LO
D44TD via IV3SKB
DD5M via DJØZY
DU/HB9CVN via HB9CXZ
E31AA via ZL1AMO
EA/CT1RH via CT1RH
EA2RY/HI7 via EA2RY
EA6/HB9XCL/P via HB9XCL
ED6IHP via EA6SB
ED8LHT via EA8AKN
EK8WB via IK2QBR
EN6ØEKR via UT4EK
EO6ØQF via UT7QF
EY8MM via K1BV
FH/F6AML via F6AML
FP/AC8W via K8NA
FP/K8AQM via K8AQM
FP/K8DD via K8NA
FP/K8GL via K8NA
FP/K8MM via K8MM
FP/W8IQ via W8IQ
FR/F6AML via F6AML
FY/FØCRS via F5KIN
FY/F5IRO via F5KIN

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>.)

all Most Wanted list will also be posted on the DX Publishing website, <www.dxpub.com> in mid-January.

WARC Bands

I've mentioned before my late start in working the WARC bands. I really just started working these bands in August of 2004, when I discovered that my two-element 40-meter beam would work rather well on both 17 and 12 meters. At the same time, I found that my lowly 80-meter dipole would do a pretty fair job on 30 meters, too.

Not wanting to damage either my equipment or my antennas, I decided that I would only run 100 watts and see what I could do. Well, as of early October 2005, just 14 months after starting my "chase," I now have logged the following: 30 meters, 140 countries in 28 zones; 17 meters, 196 countries in 34 zones; and on 12 meters, 101 countries in 25 zones. Now I know that those with resonant antennas and higher power could have done a lot more than this, but what I have done proves a point: You don't have to have all that high-priced "stuff" to work 100 or more countries, at least on the WARC bands, and I've done it under far less than ideal propagation conditions. Could you do it? Sure you could. You just have to try.

As we approach the new year, I urge all of you to reflect on your operating over the past year. Did you get things done that you wanted to get done? Did your equipment perform as you expected? Are your antennas working as well as they could? What have you done to bring someone new into the wonderful world of DXing and/or contesting? Are you an Elmer to a newly licensed ham? Is your operating such that you would want someone to sound like you on the air?

Maybe we could make some of those New Year's Resolutions, except we really should try to keep the ones we make.

Until next time, enjoy the chase, but above all else Have Fun!

73, Carl, N4AA

The CQ DX Field Award Program

Mixed

55	W4UM	57	HB9BGV
56	K2AU	58	TA3J

SSB

33	HB9BCV	34	TA3J

CW

26	N4NX	28	K2AU
27	HB9BGV		

Endorsements

Mixed

175	W4UM/183	3.5/7 MHz	N4NX
175	N4NX/182	3.5/7 MHz	KØDEQ
175	K2AU/177	1.8 MHz	N4NX
100	PY2DBU/111	1.8 MHz	KØDEQ
28 MHz	N4NX		

SSB

3.5/7 MHz	KØDEQ

CW

150	N4NX/168	3.5/7 MHz	KØDEQ
100	K2AU/131	1.8 MHz	N4NX
28 MHz	N4NX	3.5/7 MHz	KØDEQ
3.5/7 MHz	N4NX		

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Please make all checks payable to the award manager.

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BY JOHN DORR,* K1AR

Having Fun While Deciphering Operating Strategy

December's Contest Tip

Make sure you have your hand on that RIT control, especially when running on CW. While we can sometimes get lazy and just wait for stations to conveniently call us in our passbands, the reality is that many operators do a poor job of zero-beating a station they want to work. One additional item of concern: Aggressive use of your RIT when running stations also requires that you are certain the station you hear (and log) is actually calling you! This is the single most common reason why "not in log" QSOs take place, which can really hurt your score. When used correctly, the RIT control can be your best friend.

If you're a new contester, it may seem that there are a million questions you have about contesting and ways to improve your score. The fact is that no matter what level of experience you may have developed over time, a fundamental key of all contesting that we sometimes seem to forget is to have fun. In the inevitable desire to win, we often forget about that simple goal. For many, fun can be defined simply by using a contest weekend to work a few new ones on the bands. For others, a winning score is paramount.

As I enter my 37th year of contest operating, I'm learning that fun for me is defined as contesting in new and interesting ways. Put another way, it's easy to get into a rut. In my case, that was single operator contesting. While I'm not giving up on doing it, contesting in that form has lost its appeal for me. With the possibility of operating off-shore, helping local friends get a new contest station off the ground, or simply taking a contest weekend to "play around," contest operating doesn't have to be monotonous. In fact, after 36 years, it can indeed still be fun.

A component of having fun includes the ability to balance operating strategy and contest operating itself. In fact, one of the most common topics I receive questions about centers around basic operating strategy. Regardless of your personal goals, if you're active in contesting at all, a part of your desire should be to improve your results and skills. With that being said, the following focuses on the most commonly asked questions I receive about contesting. Although it's hardly a comprehensive list, it may help take some of the mystery out of contesting for you and perhaps increase your level of fun.

What's the best way to improve my operating skills?

No matter how much experience you have in contesting, there will always be someone who is a better operator and there will be many more who lack your level of skill. It's like money, career, weight, or nearly anything else in life. We all are participating members in a mathematical bell curve. Contesting is no different.

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Calendar of Events

Nov. 19–20	LZ DX Contest
Nov. 19–20	RSGB 1.8 MHz CW Contest
Nov. 19–21	ARRL SSB Sweepstakes
Nov. 26–27	**CQ WW DX CW Contest**
Dec. 2–4	ARRL 160M Contest
Dec. 10-11	ARRL 10M Contest
Dec. 17	OK DX RTTY Contest
Dec. 17	RAC Canada Winter Contest
Dec. 17–18	Croatian CW Contest
Dec. 17–18	Stew Perry Topband Challenge
Jan. 1	ARRL Straight Key Night
Jan. 7–8	ARRL RTTY Roundup
Jan. 8	Kid's Day
Jan. 14–15	North American CW QSO Party
Jan. 28–29	**CQ WW 160 Meter CW Contest**
Feb. 25–26	**CQ WW 160 Meter SSB Contest**

There are many ways to improve operating skills, but the most obvious one is to get on the air and operate. Put another way, there is no short-cut to experience. While some contesters seem to get there faster than others, no world-class operator became one overnight. Here are some other tips:

• Spend time listening to others, especially those contesters whom you respect for their operating skill and results. Listen to their operating style. What are they doing differently than you?

• Use smaller contests as a more casual way to improve your skills. Sometimes the heavy-hitter events can be intimidating and do not provide the help you need.

• Get on the air in between contests. Working DX, conversational CW, and traffic nets are just some of the ways to hone your general operating skills.

• Make a list of areas in which you need improvement. It may be CW speed or copying ability in high-QRM situations. Working low-band DX, as an example, will help you pull weak ones out of the noise—a skill that can help in any contest.

What are some tips that anyone can use to improve his or her score?

The best advice I can offer here is to use common sense. For example, consider when working a station in another country that your use of "cute" phonetics may not resonate with the other guy. Sending CW at twice the speed of the other station will likely result in your not making the QSO at all or in taking more time to do it. In addition:

• Make sure you know the rules of the contest. A common mistake in many contests is to miss out on easy QSOs/multipliers that would increase your score if you "only knew to work them."

• Send the minimum amount of information needed to make a contest QSO. If you feel compelled to say more, save it for outside the contest (or as one fellow said to me once, "Write him a letter!").

• Check out your station before the contest. Is your audio and/or CW signal up to par? Are there other station deficiencies that need to be addressed in advance?

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• Maximize the capability of your station and try not to exceed it. For example, if you have a marginal signal on a band, invest your operating time elsewhere as much as possible.

• Obtain copies of other local stations' logs and review band openings, QSO rates, and other operating metrics. You will likely learn something from someone in your own back yard.

How do I know when to run vs. search and pounce?

This is always one of the most challenging operating decisions for any station. The key is to be realistic about your own station capabilities. If you're using wire antennas and low power, running stations is going to be possible only at the peak of band openings. Searching and pouncing can actually produce reasonable rates and will likely produce more productive results than banging your head against the wall by CQing.

Some other factors to consider include:

• A sudden drop in QSO rate usually means that someone has taken over the frequency and it's time to move. You may not even hear the other station, so let your QSO rate be a good measure of when to change frequency or stop running.

• If you have been on the same frequency for an extended period of time, it may be time to move on and tune the band a bit. Only the biggest of contest stations have the luxury of staying in one spot and generating productive runs for hours at a time (if not for the entire contest).

• Ask the stations you are working to give you a QRM report for your frequency.

• Be cognizant of when bands are due to open and close. A review of previous years' logs (including those of others) can help.

• After moving to another frequency, if you find it's still impossible to get a good rate going it may be time to "tune the bands" or move to another band.

What band should I be using?

The answer to this one is both simple and complex. Clearly, the obvious answer is to use the band that generates the highest rate/score. The common convention for DX contests is to use the highest band open, especially in marginal conditions where the band may not survive a significant opening. In addition, here are a few other concepts:

• Keep an eye on your QSO mix between bands (for those contests in which stations may be worked on multiple bands). For example, if you have not used 80 meters very much during the contest, it may be time to go, even if your intuition suggests otherwise.

• Always be aware of what's happening on other bands. There is nothing worse than to be slugging it out on 20 meters only to discover that 15 meters has been wide open for over an hour.

• Maximize specific band conditions for your station. If you have a low antenna on 40 meters, for example, be sure to operate there when high-angle signals are predominant. Leave the low-angle long-path openings to the big boys.

• Keep moving around, especially if you have a smaller station. In this case, band selection is not as important as keeping your VFO moving to maximize your on-the-air exposure, especially if you're in search-and-pounce mode. I've often viewed on-the-air operating as participating on one, large band vs. a discrete set of frequencies.

• Try to occasionally operate on bands where the obvious suggests you do something else. You may be a lucky operator to discover a unique opening or work a multiplier that others end up missing.

When do I stop trying to work someone in a pile-up?

One can only be subjective with this topic. Despite what you may think in a given contest, even the big stations sometimes have trouble breaking certain pile-ups. A useful metric is to balance the point value of the station you are calling against your sense of what you could be working by moving on and logging others. Also, being realistic about your station's capabilities applies here, too. There's no point in spending a long time calling a VY1 in the ARRL Sweepstakes if you know in your gut that your station just doesn't have the horsepower to get through.

What part of the band should I use when trying to run?

There are no absolute answers to this one, but again common sense prevails. In many of the major contests (especially DX ones), big stations dominate the lower parts of a band and the more modest setups move up accordingly. As it turns out, contest activity is high for most major events, so there is plenty of action available regardless of where in the band you operate. The best advice one can give is: (1) Make sure whatever frequency you're using is reasonably clear (including the other end); (2) make certain you are operating in a spot that is not disturbing others, especially non-contest operations; and (3) don't be afraid to move up the band .Some of the best multiplier stations are doing the same thing and are ready for the taking high up the band.

Final Comments

It's been suggested a number of times that a contesting book could be written on this month's topic. While I'm not sure a book is in order (and I certainly know that I don't have the time to do it!), the sport of contesting can often be complex. Whether you're new to the game or a seasoned pro, the knowledge you have today is, by definition, greater than that of last year or the one before it. With that in mind, leverage your skill and experience. Share it with others. Except in the heat of battle, contesting is a social sport that depends on the experience of us all to thrive and grow.

That's it for this month. The 2005 CQ Contest Survey results are coming soon. Thanks for your record level of participation, and from my family to yours, all the best for this holiday season. It's hard to believe that another year is in the books. 73, John, K1AR

propagation

BY TOMAS HOOD,* NW7US

December Propagation

A Quick Look at Current Cycle 23 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, September 2005: 22
Twelve-month smoothed, March 2005: 34

10.7 cm Flux
Observed Monthly, September 2005: 91
Twelve-month smoothed, March 2005: 97

***Ap* Index**
Observed Monthly, September 2005: 21
Twelve-month smoothed, March: 15

A moderate to low level of solar activity is expected during December, with 10.7-cm flux levels peaking in the 80s. The density of ionization in the Northern Hemisphere is expected to increase more rapidly after sunrise than during other seasons. Static and atmospheric noise levels will be at seasonally low values during the month. Reasonably strong signal levels are expected on most of the open bands, while the high-

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LAST-MINUTE FORECAST

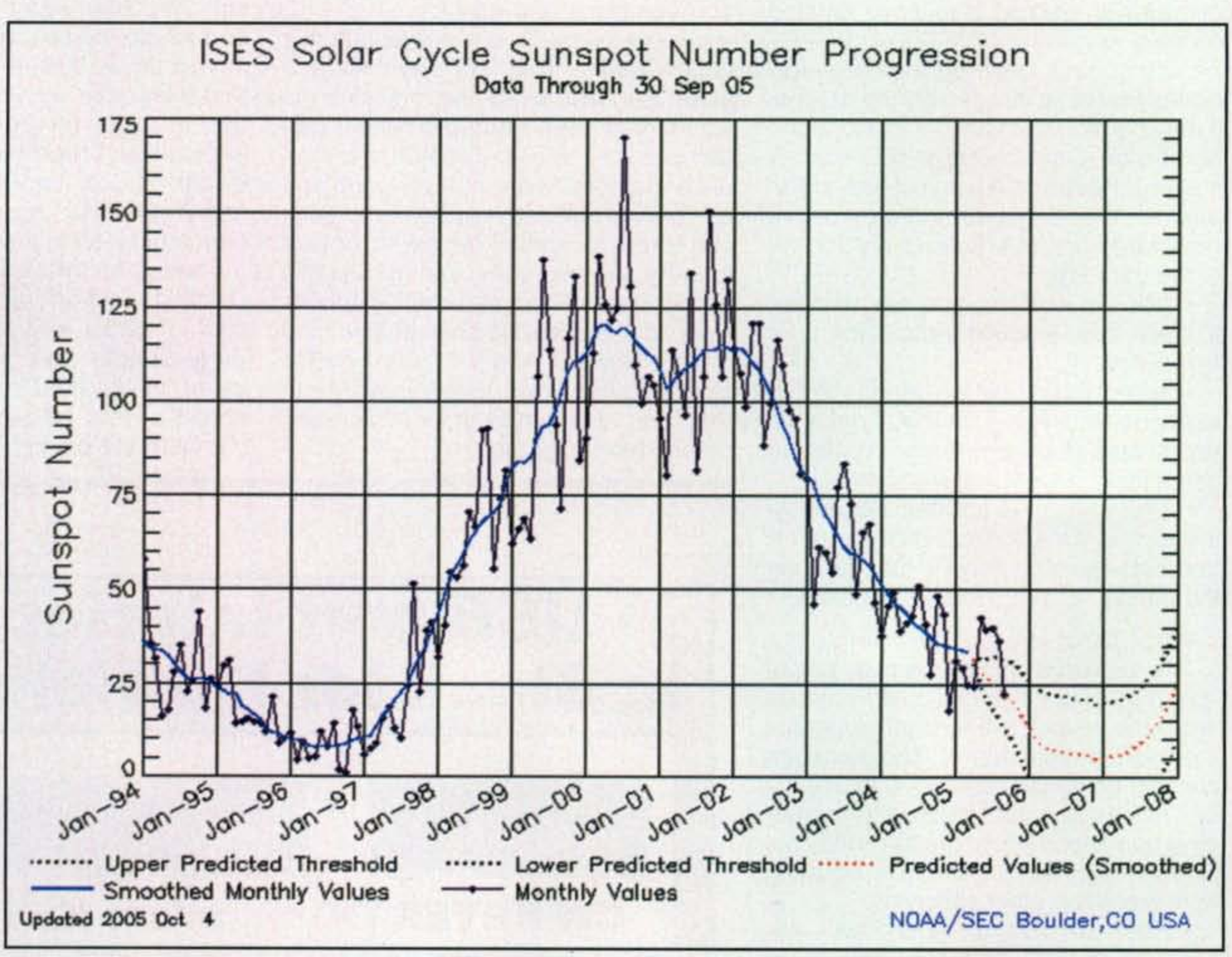
Day-to-Day Conditions Expected for December 2005

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 3-16, 20, 24-27, 30-31	A	A	B	C
High Normal: 1, 17-19, 21-23, 28	A	B	C	C-D
Low Normal: 2, 29	B	C-B	C-D	D-E
Below Normal: none	C	C-D	D-E	E
Disturbed: none	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be good (B) on Nov. 1st and 3rd, excellent (A) on the 2nd, fair to good on the 4th, and no openings expected on the 5th and 7th, etc.



Solar Cycle 23 sunspot number progression through September 2005. As can be seen, the cycle is moving quickly now toward the solar cycle minimum, expected sometime between 2006 and 2007. (NOAA/Space Environment Center)

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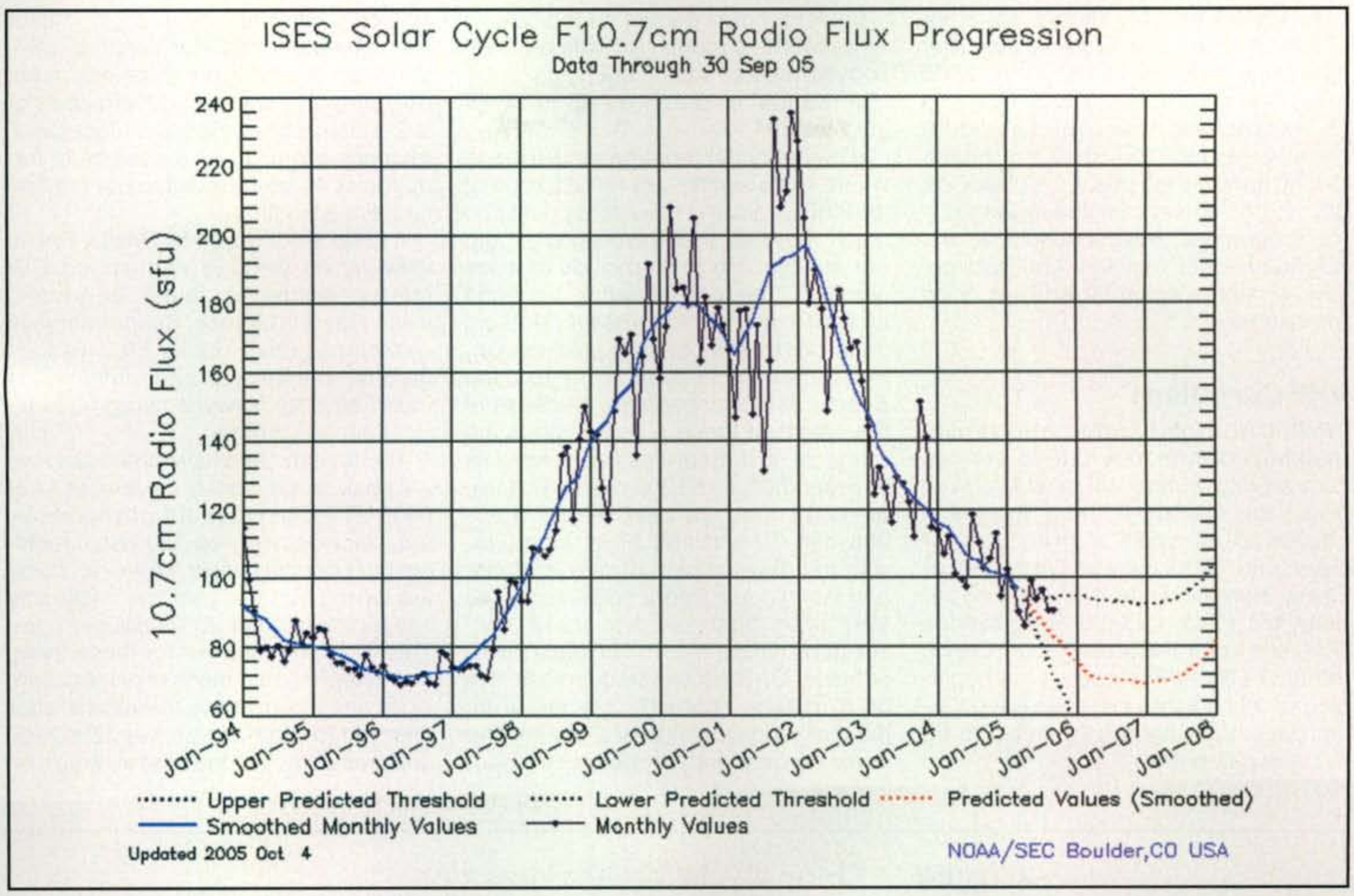


The Cycle 23 10.7-cm radio flux progression through September 2005. Notice the second, very pronounced second peak during the middle of this current cycle. We are now seeing quite a reduction in solar activity since the peak. (NOAA/Space Environment Center)

er bands will not be as hot as during the peak years.

Continue to expect fair daytime openings on 10, 12, and 15 meters primarily on north/south paths, with the strongest being on 15. Openings will be shorter than the same time last year due to the lower solar activity, but these should still hold promise for short DX openings.

Ten- and 12-meter DX openings should be possible during much of the daylight hours, especially where the propagation paths cross the sunlit regions. Fairly good DX openings are also expected on 17 and 15 meters, remaining open towards the west during the early evening. However, 20 meters will be the hottest of all daytime bands, starting with early morning openings in all directions until about an hour or two after sunrise, and then remaining open into one place or another through the day until early evening. Thirty meters will be a strong player for DXing, as well, following the pattern of 20 meters. When conditions are Above Normal, 30, 20, and 17 meters are likely to remain open towards the south and west from early evening until about midnight, mostly for DXers in the lower latitudes.

On 40 meters regional daytime openings will remain strong for most of the day, while great DX will open early in the afternoon. From midnight to sunrise, 40 promises some of the hottest nighttime DX during December. The first DX openings should be toward Europe and the east during the late afternoon, then move across the south through the hours of darkness, while remaining open into most parts of the world. Just after sunrise, openings will be more in a westerly direction. Low seasonal noise will make DXing a pleasurable endeavor.

DX openings on 160 and 80 meters during the hours of darkness and into the sunrise period, with considerably decreased static levels, are a sure bet during the longer hours of darkness in the northern latitudes. Look for openings toward Europe and the south from the eastern half of the United States and towards the south, the Far East, Australasia, and the South Pacific from the western half of the country. Eighty meters becomes a reliable long-distance band throughout the entire period of darkness during December. Openings on 80 should peak towards Europe and in a generally easterly direction around midnight, and then open in a generally western direction with a peak just after sunrise. The band should remain open towards the south throughout most of the night.

Overall, expect fair DX conditions on the higher bands on and above 15 meters, with good DX openings on 15 through 20 meters during most of the daylight hours. As night falls, move to 30, 40, and 80 meters for openings all over the DX world.

For short-skip openings during December, try 80 and 40 meters during the day for paths less than 250 miles, and 80 or 160 meters at night for these distances. For openings between 250 and 750 miles, try 40 meters during the day, and both 80 and 160 at night. For distances between 750 and 1300 miles, 20 and 30 should provide daytime openings, while 40 and 80 will be open for these distances from sunset to midnight. After midnight, 80 meters will remain open out to 1300 miles until sun-

rise. Try 30 and 40 meters again for about an hour or so after sunrise. For openings between 1300 and 2300 miles, openings will occur on 20, 17, and 15 meters, with fewer on 12 and 10 meters, during the daylight hours. During sundown to midnight, check 20, 30, and 40 meters for these long-distance openings, and then check 40 and 80 meters after midnight until sunrise. Try 40 meters again for an hour or so after sunrise.

VHF Conditions

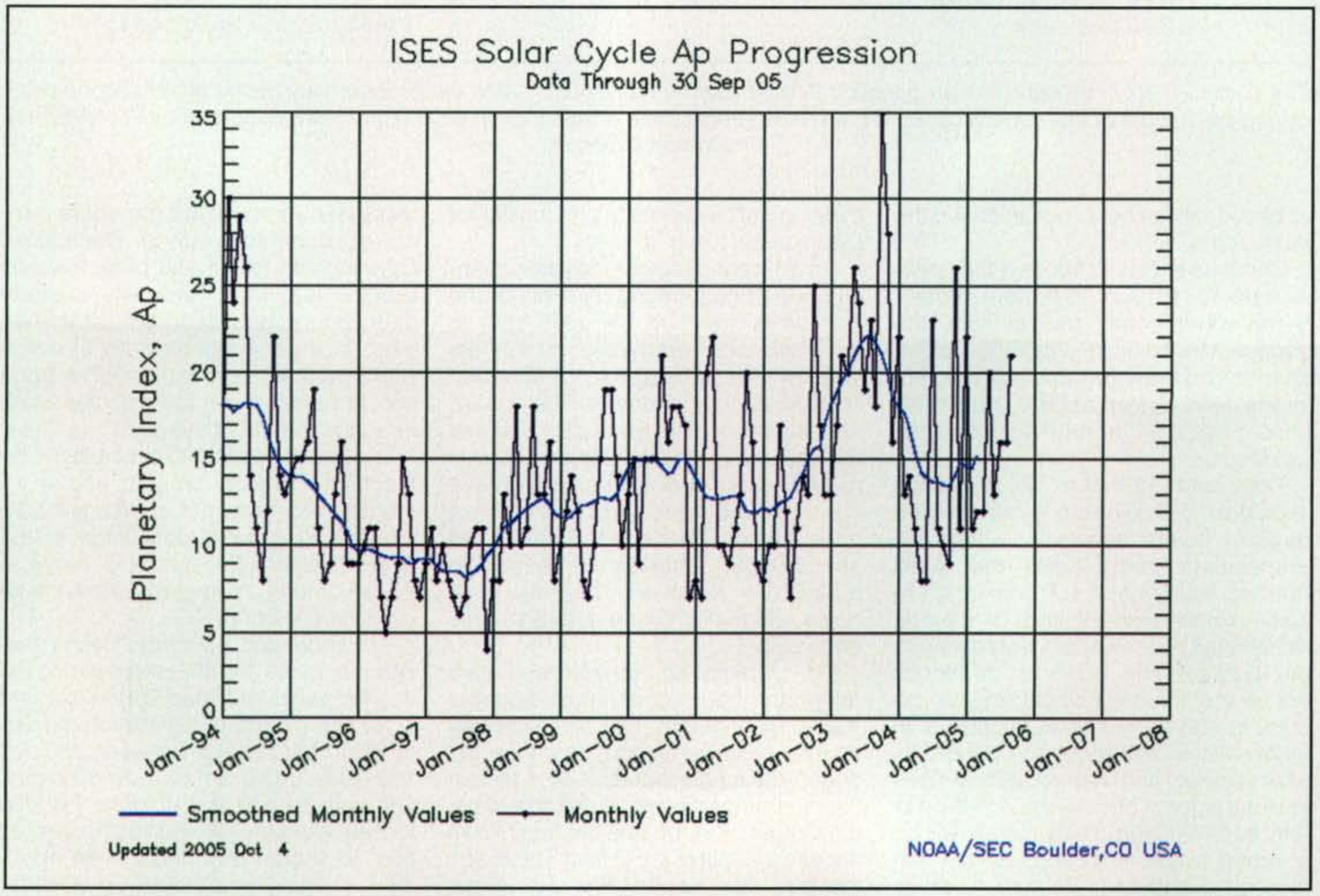
While there might be an occasional geomagnetic disturbance due to coronal hole activity, aurora will most likely not occur this month. If there were any chance at all, you'll want to look for days with conditions at Disturbed or Below Normal, when there is a possibility for Field Aligned Irregularities (FAI) and auroral-*E* propagation. Check the Last-Minute Forecast at the beginning of this column for those days during December that are expected to be in these categories.

Look for some decent meteor shower activity this month, providing conditions for meteor-scatter openings on the VHF bands for distances up to about 1000 miles.

Meteor-scatter propagation is a mode where radio signals are refracted off of the ionized plasma trails left by dust and small particles that have entered into our atmosphere at thousands of miles per hour. The ionized trail is produced by vaporization of the meteor. Meteors no larger than a pea can produce ionized trails up to 12 miles in length in the *E*-layer of the Ionosphere. Because of the height of these plasma trains, the range of a meteor-scatter contact is between 500 and 1300 miles. The frequencies that are best refracted are between 30 and 100 MHz. However, with the development of new software and techniques, frequencies up to 440 MHz have been used to make successful radio contacts off of these meteor trains. On the lower frequencies, like on 6 meters, contacts may last from mere seconds to well over a minute. The lower the frequency, the longer the specific opening made by a single meteor train. A meteor train that supports a 60-second refraction on 6 meters might only support a one-second refraction for a 2-meter signal. Special high-speed methods are used on these higher frequencies to take advantage of the limited available time.

A great introduction by Shelby Ennis, W8WN, on working high-speed CW meteor scatter is found at <http://www.amt.org/Meteor_Scatter/shelbys_welcome.htm>. Links to various groups, resources, and software is found at <http://www.amt.org/Meteor_Scatter/default.htm>.

The annual *Geminids* meteor shower will peak on the night of December 14 at 0400 UTC. This is one of the better showers, since as many as 120 visual meteors per hour may occur. However, some are saying that this year, we might only see a maximum of 20 visuals per hour. This is a great shower for those trying the meteor-scatter mode of propagation, since one doesn't have to wait until after midnight to catch this shower. The radiant rises early, but the best viewing and



As can be seen in the solar Cycle Ap *progression for Cycle 23, we saw a very high amount of geomagnetic activity during the decline of this cycle. It is expected to quiet down quite a bit now, as we approach the cycle minimum. (NOAA/Space Environment Center)*

operating time will be after midnight local time. This shower also boasts a broad maximum, lasting nearly one whole day, so no matter where you live, you stand a decent chance of catching sight of some *Geminids*.

There is considerably less likelihood for 6-meter trans-equatorial (TE) openings during December, but look for a possible opening between the southern states and locations deep in South America. The best time to look for these is between about 8 and 11 PM local time.

Check out <http://www.imo.net/calendar/cal05.html> for a complete calendar of meteor showers in 2005.

Current Solar Cycle Progress

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 90.8 for September 2005, only a tenth of a point up from August. The 12-month smoothed 10.7-cm flux centered on March 2005 is 97.2, just down from February's 98.5. The predicted smoothed 10.7-cm solar flux for December 2005 is about 78, give or take about 17 points.

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for September 2005 is 22.1, down from August's 36.4. The lowest daily sunspot value during September 2005 was 7, occurring on the 30th. The highest daily sunspot count for September was 50 on the 13th. The 12-month running smoothed sunspot number centered on March 2005 is 33.6. A smoothed sunspot count of 16 is expected for December 2005, give or take about 12 points.

The observed monthly mean planetary *A*-Index (*Ap*) for September 2005 is 21, up from the previous few months (13, 16, and 16). The 12-month smoothed *Ap*-index centered on March 2005 is 15.3. Expect the overall geomagnetic activity to be quiet during most days in December. At the time of writing, the forecast holds that December will be a very quiet month with little to no geomagnetic storminess. Refer to the Last-Minute Forecast for the outlook on what days that this might occur.

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may e-mail me, write me a letter, or catch me on the HF amateur bands. Please come and participate in my online propagation discussion forum at <http://hfradio.org/forums/>. See you on the air, perhaps during the contest weekend!

73, Tomas, NW7US/AAAØWA

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *daylight* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado 80302.

December 15, 2005-February 15, 2006
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Central Europe & North Africa	09-11 (1)** 08-09 (1) 09-11 (2) 11-12 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	15-16 (1) 16-17 (2) 17-19 (3) 19-01 (2) 01-03 (3) 03-04 (2) 04-05 (1)	17-19 (1) 19-20 (2) 20-02 (3) 02-03 (2) 03-04 (1) 20-00 (1)* 00-02 (2)* 02-03 (1)*
Northern Europe & CIS (former European USSR)	08-10 (1)	06-07 (1) 07-11 (2) 11-12 (1)	15-17 (1) 17-19 (2) 19-01 (1) 01-02 (2) 02-03 (1)	17-19 (1) 19-01 (2) 01-03 (1) 21-00 (1)*
Eastern Mediterranean & Middle East	08-09 (1) 09-10 (2) 10-11 (1)	07-08 (1) 08-10 (2) 10-12 (3) 12-14 (2) 14-15 (1)	17-19 (1) 19-21 (2) 21-00 (1) 00-01 (2) 01-02 (1)	18-20 (1) 20-22 (2) 22-00 (1) 20-22 (1)*
Western Africa	10-12 (1)** 08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18(1)	18-20 (1) 20-23 (2) 23-02 (1) 02-03 (2) 03-04 (1)	19-22 (1) 22-01 (2) 01-03 (1) 22-01 (1)*
Eastern & Central Africa	08-11 (1) 11-13 (2) 13-14 (1)	07-13 (1) 13-16 (2) 16-18 (1)	18-20 (1) 20-23(2) 23-01 (1)	19-00 (1)
Southern Africa	10-13 (1)** 08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-09 (1) 12-14 (1) 14-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	18-20 (1) 20-22 (1) 22-00 (1) 22-00 (1)	19-22 (1)
Central & South Asia	16-18 (1)	07-10 (1) 19-21 (1)	06-08 (1) 18-22 (1)	06-07 (1) 18-20 (1)

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South-east Asia	16-18 (1)	07-10 (1) 17-20 (1)	06-08 (1) 18-21 (1)	06-07 (1) 18-20 (1)
Far East	16-18 (1)	06-07 (1) 07-09 (2) 09-11 (1) 15-17 (1) 17-19 (2) 19-21 (1)	05-08 (1) 17-18 (1)	05-08 (1) 17-18 (1)
South Pacific & New Zealand	13-15 (1)** 12-14 (1) 14-17 (2) 17-18 (1)	05-07 (1) 07-10 (2) 10-18 (1) 18-20 (2) 20-22 (1)	01-02 (1) 02-04 (2) 04-07 (3) 07-08 (2) 08-09 (1)	04-05 (1) 05-07 (2) 07-08 (1) 04-07 (1)*
Austral-asia	14-16 (1)** 12-15 (1) 15-17 (2) 17-18 (1)	06-07 (1) 07-10 (2) 10-12 (1) 15-16 (1) 16-19 (2) 19-21 (1)	03-05 (1) 05-08 (2) 08-09 (1) 17-19 (1)	05-06 (1) 06-07 (2) 07-08 (1) 17-18 (1) 05-07 (1)*
Carib-bean, Central America & Northern Countries of South America	10-15 (1)** 08-09 (1) 09-12 (2) 12-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-08 (3) 08-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-18 (4) 18-19 (2) 19-20 (1) 01-03 (1)	17-18 (1) 18-19 (2) 19-21 (3) 21-03 (2) 03-06 (3) 06-07 (2) 07-08 (1)	18-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-07 (1) 21-03 (1)* 03-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina and Uruguay	11-15 (1)** 08-09 (1) 09-11 (2) 11-13 (1) 13-14 (2) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-09 (2) 09-10 (1) 12-14 (1) 14-15 (2) 15-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 22-00 (1)	19-21 (1) 21-02 (2) 02-05 (1) 05-06 (2) 06-07 (1)	21-03 (1) 03-05 (2) 05-06 (1) 03-05 (1)*
McMurdo Sound, Antarc-tica	15-17 (1)	07-09 (1) 17-18 (1) 18-20 (2) 20-22 (1) 22-00 (2) 00-02 (1)	22-00 (1) 00-02 (2) 02-06 (1)	Nil

Time Zones: CST & MST (24-Hour Time) CENTRAL USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Wsetern & Southern Europe & North Africa	09-11 (1)	06-08 (1) 08-10 (2) 10-12 (3) 12-13 (2) 13-15 (1)	15-17 (1) 17-19 (2) 19-12 (3) 23-01 (2) 01-02 (1)	17-19 (1) 19-00 (2) 00-01 (1) 20-01 (1)*
Northern Europe & CIS (former Eurpean USSR	08-11 (1)	07-08 (1) 08-11 (2) 11-12 (1)	16-18 (1) 18-19 (2) 19-22 (1) 22-00 (2) 00-01 (1)	18-00 (1) 20-00 (1)*
Eastern Mediter-ranean & Middle East	08-11 (1)	07-09 (1) 09-12 (2) 12-14 (1) 22-00 (1)	17-19 (1) 19-22 (2) 22-23 (1)	19-22 (1)
Western Africa	09-12 (1)** 08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-18 (1)	17-20 (1) 20-23 (2) 23-01 (1)	19-22 (1) 22-23 (2) 23-00 (1) 21-23 (1)*
Eastern & Central Africa	09-12 (1)	07-12 (1) 12-14 (2) 14-16 (3) 16-17 (1)	18-19 (1) 19-21 (2) 21-23 (1)	19-22 (1)
Southern Africa	10-12 (1)** 08-10 (1) 10-13 (2) 13-14 (1)	07-13 (1) 13-15 (2) 15-16 (3) 16-17 (2) 17-18 (1) 22-00 (1)	18-19 (1) 19-21 (2) 21-23 (1)	19-22 (1)
Central & South Asia	17-19 (1)	07-10 (1) 19-21 (1)	06-08 (1) 18-21 (1)	06-07 (1) 18-20 (1)
South-east Asia	17-19 (1)	06-07 (1) 07-09 (2) 09-12 (1) 17-20 (1)	06-08 (1) 17-19 (1)	06-07 (1) 17-19 (1)
Far East	17-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 15-17 (1) 17-19 (2) 19-20 (1)	01-03 (1) 03-07 (2) 07-08 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
South Pacific & New Zealand	12-16 (1)** 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-11 (2) 11-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	23-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-09 (1)	00-01 (1) 01-06 (2) 06-08 (1) 03-07 (1)
Austral-asia	14-17 (1)** 11-15 (1) 15-17 (2) 17-18 (1)	07-08 (1) 08-11 (2) 11-18 (1) 18-20 (2) 20-21 (1)	01-03 (1) 03-07 (3) 07-08 (2) 08-09 (1)	03-05 (1) 05-07 (2) 07-08 (1) 04-07 (1)*
Carib-bean, Central America and Northern Countries of South America	10-15 (1)** 08-09 (1) 09-10 (2) 10-13 (3) 13-15 (4) 15-16 (3) 16-17 (1)	06-07 (1) 07-10 (3) 10-14 (2) 14-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-21 (1) 23-01 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-04 (2) 04-06 (3) 06-07 (1)	19-21 (1) 21-05 (2) 05-06 (1) 23-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina and Uruguay	11-15 (1)* 08-09 (1) 09-11 (2) 11-13 (1) 13-14 (2) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 22-00 (1)	19-21 (1) 21-02 (2) 02-04 (1) 04-06 (2) 06-07 (1)	21-05 (1) 00-04 (1)*
McMurdo Sound, Antarc-tica	15-17 (1)	07-08 (1) 08-09 (2) 09-11 (1) 17-18 (1) 18-20 (2) 20-22 (1) 22-00 (2) 00-01 (1)	22-00 (1) 00-02 (2) 02-06 (1)	Nil

Time Zone: PST (24-Hour Time) WESTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Southern Europe & North Africa	08-10 (1)	06-07 (1) 07-11 (2) 11-13 (1) 23-01 (1)	17-21 (1) 21-23 (2) 23-01 (1)	18-20 (1) 20-22 (2) 22-23 (1) 19-22 (1)*
Northern Europe & CIS (former European USSR)	08-10 (1)	06-07 (1) 07-10 (2) 10-12 (1) 23-01 (1)	17-00 (1)	19-22 (1) 19-21 (1)*
Eastern Mediter-ranean & Middle East	08-10 (1)	07-10 (1) 10-12 (2) 12-13 (1) 21-23 (1)	06-08 (1) 18-22 (2)	06-08 (1) 18-21 (1)
Western Africa	09-11 (1)** 08-09 (1) 09-12 (2) 12-13 (1)	07-10 (1) 10-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	18-23 (1)	19-22 (1)
Eastern & Central Africa	09-11 (1)	08-10 (1) 13-16 (1) 21-23 (1)	06-08 (1) 18-22 (1)	06-08 (1) 18-21 (1)
Southern Africa	08-10 (1) 10-12 (2) 12-14 (1)	09-13 (1) 13-16 (2) 16-18 (1) 23-01 (1)	18-21 (1)	18-20 (1)
Central & South Asia	17-19 (1)	08-10 (1) 17-18 (1) 18-19 (2) 19-20 (1)	05-08 (1) 17-19 (1)	05-07 (1)
South-east Asia 17-18 (1) 18-20 (1)	14-15 (1) 15-17 (2) 16-18 (2)	08-10 (1) 13-16 (1) 07-09 (1)	01-04 (1) 04-07 (2)	04-07 (1)
Far East	14-15 (1) 15-17 (2) 17-18 (1)	08-10 (1) 13-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	22-00(1) 00-02 (2) 02-06 (3) 06-08 (2) 08-10 (1)	23-01(1)) 01-06 (2) 06-08 (1) 01-06 (1)*
South Pacific & New Zealand	14-16 (1)** 11-13 (1) 13-14 (2) 14-16 (3) 16-18 (2) 18-19 (1)	07-08 (1) 08-13 (2) 13-15 (1) 15-16 (2) 16-18 (4) 18-19 (2) 19-21 (1)	20-22 (1) 22-00 (2) 00-07 (3) 07-08 (2) 08-09 (1)	00-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
Austral-asia	14-16 (1)** 12-13 (1) 13-15 (2) 15-17 (3) 17-18 (1)	07-08 (1) 08-11 (2) 11-17 (1) 17-18 (2) 18-19 (3) 19-20 (2) 20-21 (1)	01-03 (1) 03-05 (2) 05-07 (3) 07-08 (2) 08-09 (1)	03-05 (1) 05-06 (2) 06-08 (1) 04-07 (1)*
Carib-bean, Central America and Northern Countries of South America	11-14 (1)** 08-09 (1) 09-10 (2) 10-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-09 (3) 09-13 (2) 13-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-00 (1) 00-02 (2) 02-03 (1)	18-20 (1) 20-21 (2) 21-23 (3) 23-01 (2) 01-03 (3) 03-04 (2) 04-05 (1)	19-21 (1) 21-03 (2) 03-04 (1) 21-03 (1)*
Peru Bolivia, Paraguay, Brazil, Chile, Argentina and Uruguay	11-14 (1)** 08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-17 (4) 17-18 (2) 18-21 (1)	19-21 (1) 21-00 (2) 00-02 (1) 02-04 (2) 04-06 (1)	22-05 (1) 00-04 (1)*
McMurdo Sound, Antarc-tica	14-16 (1)	07-08 (1) 08-09 (2) 09-11 (1) 15-17 (1) 17-19 (2) 19-21 (1) 21-23 (2) 23-01 (1)	21-00 (1) 00-02 (2)	Nil

** Indicates best time for 160 meter openings.*
*** Indicates best time for 10 meter openings.*
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

CQ WW CW Contest Forecast Looks Great! Good to Excellent Conditions Expected

Since this issue should reach most subscribers before the CW contest begins, here's a quick update for the 2005 CQ WW CW Contest weekend that starts at 0000 UTC, Saturday, November 26 and continues until 2400 UTC, Sunday, November 27. It still looks like excellent conditions are expected for the weekend. As forecast previously, look for High Normal conditions for the first contest day, and Above Normal for the second. Daily 10.7-cm solar flux levels are expected to be from 75 on day one to 80 on the second day. The geomagnetic planetary *A*-index is expected to be about 8 during the CW contest. You can also see an up-to-the day "Last-Minute Forecast" on my propagation resource center, at <http://prop.hfradio.org/>.

Number groups after calls denote score, total QSOs, W/VE multiplier, countries worked. Total multiplier is the addition of the W/VE and countries. Multi-op scores follow single-op listings. An asterisk (*) denotes low power. State, province, and country certificate winners are listed in bold.

2005 CW RESULTS

SINGLE OPERATOR

NORTH AMERICA

UNITED STATES

CONNECTICUT

K1ZZ	**506,466**	**1011**	**58**	**55**
NN1N	**432,345**	**941**	**59**	**52**
N4XR	251,500	735	58	42
N1ZZ	116,397	500	59	22
K1BV	50,700	322	49	11
K1KI	49,392	229	48	15
W2JU*	**48,060**	**336**	**54**	**6**
W1CTN*	45,565	249	47	18
W1JQ*	32,433	209	45	12
K1BTD*	897	27	13	0

MASSACHUSETTS

W1TO	**245,058**	**772**	**56**	**38**
W1FJ	**220,857**	**610**	**52**	**39**
K1EP*	**127,589**	**603**	**54**	**23**
K5MA	61,200	256	45	23
W1BYH*	54,243	354	55	8
W1CSM	36,344	192	40	16
WB1AEL	31,158	212	44	10
K1IR	26,277	148	44	13
W1TW/QRP	**8,307**	**93**	**39**	**8**
AJ1E/QRP	2,268	48	21	0
W1OH*	396	22	9	0

MAINE

K1JB	**47,340**	**325**	**52**	**8**
N1LW*	**10,988**	**116**	**39**	**2**
W1CEK/QRP	**5,597**	**76**	**28**	**1**

NEW HAMPSHIRE

KT1V	**699,259**	**1245**	**58**	**63**
W1ECT	432,630	1066	59	51
NE1B	34,905	176	51	14
KA1LMR/QRP	**1,584**	**25**	**20**	**2**

RHODE ISLAND

K1DT	**16,188**	**57**	**13**	**25**
W1YRC	12,096	84	33	9
AJ1M*	**11,253**	**151**	**33**	**8**
K2MN*	10,512	104	30	6

VERMONT

K1KD	**123,520**	**551**	**55**	**25**

NEW JERSEY

N2ED	**201,510**	**745**	**57**	**33**
W2YC	**133,856**	**526**	**59**	**30**
K3BU/QRP	**124,915**	**576**	**58**	**25**
WB2AA*	82,563	390	50	23
W2LE	33,231	231	39	14
W5KI	16,368	134	41	7
W2LHL*	13,572	166	36	0
WA2ALY*	12,426	150	38	0
N2MH*	9,438	119	33	0
K2RET*	6,494	78	32	2
N2LK*	5,888	110	23	0
NO2D/QRP	5,168	70	33	1
W2JEK/QRP	2,375	52	19	0
WA2RY/QRP	1,552	41	16	0
W2TAG/QRP	1,425	46	15	0
K2GN	1,020	23	15	2
N2GT*	360	17	9	0

NEW YORK

N2CU	**225,243**	**1013**	**58**	**29**
K2YR	**162,168**	**571**	**54**	**33**
K2FU	157,788	761	57	24
K2UG	93,600	414	56	24
N2EK*	**56,286**	**404**	**51**	**8**
NA2M*	42,594	254	51	11
W2IB*	37,828	326	48	1
KC2NTB/MM*	34,476	276	47	5
K2UF*	33,222	265	41	8
K2CDJ*	29,697	201	49	8
WB2DVU*	29,380	230	48	4
W2TX*	28,152	234	47	4
K2TA*	24,900	199	45	5
WB2ABD*	24,843	211	46	3
WB2HJV	19,082	165	44	3
N2GC	16,320	104	33	15
K2CS	14,335	116	40	7
W2GDJ	13,338	149	38	1
N2BZP	10,989	113	33	4
W2WB*	9,275	115	32	3
W2NRA*	8,190	101	33	2
WB2AIV*	5,373	80	27	0
K2TV*	4,176	75	24	0
N2OPW*	2,260	49	20	0
WB2TPS*	1,001	34	13	0
K1YHR*	574	19	14	0

DISTRICT OF COLUMBIA

W3DQ	**55,506**	**398**	**51**	**7**

DELAWARE

AA1K	**621,978**	**1367**	**59**	**59**

MARYLAND

K3ZO	**189,720**	**660**	**56**	**37**
N3OC	**142,332**	**548**	**57**	**30**
N3UM	124,030	619	56	23
N3AM	82,940	550	58	7
K2PLF	58,086	350	47	16
W3AZ	57,408	289	51	18
NA3M*	**44,530**	**291**	**50**	**11**
W3EKT	35,092	198	48	14
N3HUV	34,992	272	46	8
K3STX*	30,243	254	47	4
N3FX	30,096	209	47	10
NS3T*	20,884	200	45	1
W9GE	16,450	109	34	13
W6AAN	11,767	75	27	14
K3TW/QRP	**11,385**	**142**	**34**	**1**
W2GG*	9,331	128	30	1

PENNSYLVANIA

W3BGN	**489,288**	**1089**	**59**	**57**
WE3C	**434,955**	**1084**	**59**	**48**
W3TS	261,810	1065	59	31
W3GH	238,434	778	58	40
W3TDF	178,540	831	55	24
K4JLD	134,796	383	57	37
K3MD	130,338	614	53	25
K3ATO	115,150	663	52	18
K3SWZ*	**62,436**	**378**	**53**	**13**
N3RJ	57,265	316	50	15
AD8J*	45,798	390	47	4
N3GJ*	34,169	316	45	2
W3AP	26,174	235	43	3
NA3V*	24,932	228	43	3
AA3I*	21,150	201	42	3
W3UHP*	16,899	177	42	1
W3PT	15,850	111	40	10
N3KN	13,566	174	34	0
W3FVT	12,710	181	31	0
W3WH*	9,972	121	34	2
AA3TL	9,835	121	34	1
AE3J/QRP	**4,448**	**65**	**30**	**0**
N3MX	3,936	42	29	3
WA3AAN*	50	5	15	0

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ALABAMA

KA9EKJ*	**81,312**	**542**	**55**	**11**
W4NTI	41,412	302	51	7
K4ZGB*	38,665	309	48	7
K4IQJ*	26,568	214	50	4
K4HAL*	19,068	209	42	0
W4DEC*	15,308	163	43	0
W4RYW*	13,818	120	41	6
K2SC*	1,026	24	18	0

FLORIDA

K9OM	**187,209**	**591**	**57**	**36**
WJ9B*	**96,480**	**575**	**52**	**18**
W3AU*	89,320	423	52	25
W4AA*	87,750	450	52	23
K4LQ	72,491	339	46	25
KK4SI	71,820	194	53	31
WX4G	57,816	247	50	23
AD4Z	54,312	276	54	19
W4/G4BUE*	50,100	346	48	12
W7QF	32,922	171	48	14
KN4Y*	21,042	236	39	3
N4EK*	16,548	168	38	4
W4OV	14,720	128	36	10
N4AO	13,275	98	33	12
K4JAF*	10,488	105	30	8
K9HUY	8,778	105	33	5
W8IM*	1,328	40	15	1
N4DXI*	600	20	15	0

GEORGIA

NO4I	**293,378**	**1030**	**59**	**46**
K4EA	**195,990**	**768**	**59**	**35**
K4BAI	89,424	557	57	12
N4NX	67,308	393	58	13
W4OWY*	**46,665**	**327**	**53**	**8**
N4WD*	32,661	235	50	7
AK4RS	16,851	195	34	4
N4UH	16,676	120	32	12
K4GHS*	14,405	141	40	3
N4TL	11,285	132	35	2
NT4D	7,602	72	38	4
NX9T*	7,584	108	32	0
N2BT*	7,276	101	32	2
AA4FU*	3,192	70	21	0
AA4VV	1,216	29	19	0

SOUTH CAROLINA

K4CNW*	**86,868**	**453**	**56**	**20**
N2FY	26,904	172	46	11
KR4M	25,774	206	41	8
K4QO/QRP	**1,710**	**45**	**19**	**0**

TENNESSEE

K0EJ	**166,062**	**923**	**57**	**21**
AD4EB	**159,225**	**912**	**58**	**17**
W4NZ	128,478	821	57	12
K1GU	120,984	715	55	16
K4RO	109,938	624	57	16
N4IR	94,776	622	55	11
N2WN/QRP	**77,760**	**524**	**55**	**9**
NA4K	72,044	508	52	10
N4ZZ	65,395	529	52	3
W4DAN*	**56,772**	**453**	**52**	**5**
K4LTA*	52,606	404	51	7
K4AMC	40,880	309	49	7
W2OO	37,759	235	47	14
K4BEV*	28,242	221	49	5
W6UB/QRP	19,932	202	42	2
K4BX*	14,448	155	42	1
KM4H*	12,558	148	37	2
W4TDB*	11,856	137	38	1
WA4OSD*	10,032	123	38	0
W4OGG	9,158	108	37	1
K4ZMV	20,628	155	48	6
N5VI*	14,976	183	38	1
AE4Y*	11,840	148	36	1
NA4BW/QRP	**5,148**	**96**	**26**	**0**
N4TOL*	3,240	66	24	0
K4AQ/QRP	1,938	57	17	0

KENTUCKY

KM4CH/QRP	**28,101**	**253**	**50**	**1**
K4WW*	**22,800**	**197**	**47**	**3**
KM4FO*	14,574	163	42	0

NORTH CAROLINA

W4ZV	**430,350**	**1144**	**59**	**55**
N4XD	**193,590**	**767**	**57**	**33**
K4QPL	85,848	451	53	20
N4AF	71,630	437	48	17
WA4DOU*	**67,344**	**484**	**54**	**7**
K4SV	67,335	377	50	17
K4YKZ	58,620	428	51	9
WB4MSG*	44,064	377	45	6
W4TMR/QRP	**39,150**	**309**	**53**	**5**
WA4GLH	6,660	88	36	0
KW4JS/QRP	6,030	96	30	0
W4BCG*	3,375	63	25	0
KN4Q*	3,144	64	24	0
N7DLS*	2,047	43	23	0
KC4SAW*	1,980	46	18	0

VIRGINIA

W4MYA	**552,160**	**1362**	**59**	**57**
W3BP	**213,710**	**917**	**58**	**28**
W4RX	205,569	756	57	34
WK4Y	166,324	757	59	27
N3JB	87,096	438	55	21
K1KO	78,845	522	53	12
WB3BEL*	**73,556**	**368**	**56**	**18**
K3ZM	65,390	357	45	20
W4YE	61,640	360	50	17
WA4PGM/QRP	**60,652**	**450**	**53**	**6**
W2YE	52,972	288	50	18
K7CS	45,604	376	46	6
AD4TJ*	38,301	323	45	6
K4EU	37,526	239	45	13
K4ORD/QRP	28,341	263	42	5
K4UK/QRP	23,760	221	40	5
K4RDU*	17,862	202	38	1
W4PJW*	17,442	207	37	1
K1SE*	15,120	140	41	4
K4GM*	14,350	157	39	2
WF3J	12,528	155	35	1
NN3W*	11,253	145	33	0
W4HJ*	11,000	105	42	2
N4MM*	8,600	90	37	3
W4DR	6,895	51	24	11
N3CKI*	5,751	90	27	0
N4JED*	3,013	61	23	0
WD4LBR*	2,340	51	20	0

ARKANSAS

K5GO	**376,747**	**1301**	**59**	**48**
W5ZN	156,434	731	57	29
K5VR*	**28,448**	**214**	**58**	**6**

LOUISIANA

W5TVW*	**14,658**	**161**	**40**	**2**

MISSISSIPPI

NI5F	**17,052**	**144**	**43**	**6**
N5PA	16,660	133	40	9
K2FF	15,080	119	47	5

NEW MEXICO

N5UL	**106,488**	**582**	**56**	**16**
WA5IPS	10,803	113	36	3

OKLAHOMA

K2BA	**216,560**	**1157**	**59**	**21**

TEXAS

K5RX	**291,552**	**1097**	**59**	**37**
K5NZ	**142,912**	**724**	**55**	**22**
W0UO*	**133,929**	**852**	**57**	**12**
W9YYG	111,930	514	57	25
N5PO	106,930	599	55	19
N5TW/QRP	**44,834**	**335**	**51**	**7**
WA5TWL	39,270	364	50	1
K5GN	32,780	234	49	6
K5BG	30,250	228	46	9
W5XW/QRP	17,894	174	44	2
W5GCX*	10,500	109	38	4
K5SF*	8,208	110	35	1
KI0G/QRP	7,600	89	36	2
KM5I*	3,782	55	130	1

CALIFORNIA

N6RO	**292,145**	**1011**	**59**	**26**
AC6DD	**164,220**	**748**	**54**	**15**
W4EF	134,826	635	52	17
K6NR	129,940	588	54	19
NT6K*	**129,064**	**720**	**55**	**13**
W6BX*	79,732	555	54	8
K6TQ	79,001	532	52	7
W6JTI*	78,435	490	52	11
K6SE	64,896	357	53	11
KB7Q*	62,760	451	52	8
K6VVA	55,632	391	47	10
N6HC*	54,516	377	51	8
K6NA	39,208	218	48	10
N6NF*	38,448	300	47	7
K6NY	34,815	263	49	6
K6NY	34,452	268	49	5
K6RIM	32,065	230	44	9
K6XX	31,570	239	51	4
KH6DX/M	31,570	121	50	20
K6LRN	29,736	206	48	8
KI6CK	24,486	191	46	7
N6AA	23,961	197	43	6
N6WG/QRP	**23,392**	**225**	**40**	**3**
KI6T	22,246	172	44	5
W6YJ/QRP	21,726	166	45	6
K6YK	20,604	166	46	5
KE6QR	18,330	196	36	3
WA6BOB	15,498	153	38	4
W6RKC	15,228	125	42	5
W6JK*	13,817	137	38	3
W6HG	12,519	139	36	3
K6RAD	12,122	131	36	2
KA6UMQ*	11,920	130	38	2
N6PE*	10,602	120	37	1
KJ6RA*	10,250	102	39	2
N6EM*	10,230	135	28	3
K6CTA	10,179	102	36	3
KE6ZSN*	9,540	133	29	1
AD6ZJ*	9,480	93	36	4
K6DGW*	9,180	129	28	2
W6VM*	8,897	101	40	1
K6OWL*	8,235	127	26	1
AD6FR*	8,208	84	35	3
N6LL*	8,132	101	37	1
AE6NY*	7,511	104	28	1
W6RTW*	7,470	110	29	1
K6ASK	5,890	89	31	0
W6NKR*	5,728	78	31	1
KU6T*	5,700	82	28	2
NF6V*	4,344	81	23	1
W6FA	2,793	66	19	0
K6III/QRP	2,669	70	16	1
AA6EE*	1,515	49	14	1
KL7IDY*	1,411	40	17	0
W6ZL*	649	28	11	0
N6GL*	612	24	12	0

ARIZONA

KC7V	**139,587**	**743**	**55**	**14**
K8IA*	**89,375**	**574**	**57**	**8**
AC7A*	31,588	245	47	6
W7YS*	14,828	149	44	0
K7WP	10,920	120	38	1
K7IA*	10,412	118	36	2
W8TK*	1,197	23	17	2

IDAHO

KG7H	**126,548**	**776**	**54**	**14**
KA7T	65,819	353	50	11
W7QDM*	**22,542**	**189**	**48**	**3**
K7ARJ*	4,131	69	27	0

MONTANA

KS7T	**27,166**	**248**	**46**	**1**
KE7NO*	3,024	47	27	0

NEVADA

W7RN	**249,760**	**1004**	**58**	**22**
WA7CWM	32,946	279	48	3
AE7DX*	**6,550**	**113**	**25**	**0**
NU7T/QRP	**1,770**	**56**	**15**	**0**

OREGON

W2VJN	**144,552**	**508**	**52**	**24**
K4XU	102,700	529	54	11
KI7Y	62,940	405	50	10
W3CP*	**24,650**	**210**	**46**	**4**
N7VS*	10,500	124	33	2
K7VIT*	4,617	65	26	1

UTAH

AF7Y	**21,315**	**176**	**44**	**5**
WA7LNW	4,480	109	20	0
W7HS*	2,576	40	28	0

WASHINGTON

K7QX	**183,160**	**922**	**57**	**19**
N9ADG*	**69,184**	**406**	**52**	**12**
N4SL	61,800	379	50	10
N7LOX	48,720	345	50	8
W7TMT*	46,704	353	51	5
W9PL	44,408	325	49	7
K7QBO*	41,800	325	50	5
W7WKR*	38,640	297	51	5
K7UIR	33,125	252	47	6
N0AX*	31,044	244	47	5
K7ZA	26,884	208	46	6
W7RAB/QRP	**19,068**	**192**	**40**	**2**
WA7BOC*	17,501	166	38	5
K7LAY*	13,480	120	36	4
WB7FJG*	11,767	123	40	1
W7QN*	5,252	86	26	0
AD7AF*	3,458	71	17	2
K7IK*	2,354	46	22	0
W7LKG*	2,196	49	18	0
K7AWB*	2,132	34	25	1
N6KW*	420	16	12	0

WYOMING

W7SE	**137,610**	**901**	**55**	**11**
KO7X*	**43,264**	**382**	**51**	**1**

MICHIGAN

W8MJ	**183,376**	**1067**	**59**	**14**
K8IR	58,860	424	56	4
W8DCQ	39,875	321	53	2
K8GT*	**35,695**	**257**	**56**	**3**
K8MJZ*	26,978	247	45	2
K8GVK*	22,393	194	49	0
K8BB	20,339	208	42	1
K8YTO	15,350	118	45	5
N8LJ	13,818	101	43	6
NF8M*	12,207	136	38	1
K8DD*	9,594	101	39	2
N8XD*	3,718	61	26	0
N8UZE*	1,743	37	21	0

OHIO

W8CAR	**231,246**	**983**	**59**	**28**
NØFW*	**138,591**	**515**	**59**	**28**
K8FH*	124,575	688	58	17
N8BJQ	114,182	636	56	18
ND8DX	78,447	329	53	26
K8NVR*	76,797	532	56	7
WB8JUI*	64,256	422	56	8
N8AA	59,356	273	51	20
AE8M	40,480	319	51	4
W8FAX	39,680	254	53	9
WA8TNO	37,380	253	56	4
W8IDM*	27,120	248	48	0
W8PN*	26,592	241	47	1
WB8RTJ/QRP	**26,160**	**244**	**47**	**1**
N8IW*	17,960	199	40	0
W3USA	14,110	182	34	0
N8XA/QRP	10,430	130	32	3
N8OH*	9,620	118	37	0
K8MR	7,812	111	31	0
NW8F*	6,900	103	30	0
N8GU*	6,831	96	33	0
W8XY*	3,048	56	24	0
W8WTS*	3,025	53	25	0
N8IE*	2,226	47	21	0
WD8EKH*	2,112	39	22	0

WEST VIRGINIA

N8II*	**71,890**	**453**	**51**	**14**
K2UOP	61,628	281	49	22
WA8WV	33,800	288	45	5
K8OWL/QRP	**7,590**	**119**	**30**	**0**

ILLINOIS

K9DX	**527,472**	**1474**	**59**	**52**
K2AAW*	**103,836**	**639**	**59**	**9**
K9MMS*	102,115	665	54	11
N2BJ	70,119	474	56	7
K9QVB*	58,905	377	51	12
AB9H	53,244	392	54	4
K9WA*	34,925	276	52	3
WO9S	32,835	245	50	5
W9SE	30,051	234	48	5
WX9U	27,474	187	47	10
K9IJ*	25,056	198	53	1
K9OR*	20,069	188	46	1
K9JE*	16,125	165	42	1
K9ZO/QRP	**15,136**	**161**	**43**	**0**
KG9N*	8,640	84	35	5
N9GH	7,700	98	35	0
N9LYE*	6,400	88	32	0
KK9DX*	4,320	74	27	0
WD9DCW*	4,060	67	29	0
WA9LKZ*	1,950	36	25	0
W9TMW	1,500	27	25	0
W9SZ*	705	22	15	0

INDIANA

W9RE	**169,260**	**790**	**59**	**25**
K8LEE	**128,217**	**646**	**56**	**23**
K9WJU*	**114,376**	**719**	**57**	**11**
K9WWT	92,628	657	56	6
K9BG*	84,219	537	58	9
WC9C*	27,378	211	50	4
KA9F*	16,211	166	43	0
K1TN*	15,268	157	42	2
WT9U*	14,309	158	41	0
KJ9C	8,066	87	33	4
AD9T/QRP	**5,344**	**79**	**32**	**0**

WISCONSIN

KK9K	**219,037**	**1066**	**58**	**25**
K9OT*	**124,236**	**789**	**57**	**11**
WI9WI	108,868	690	59	9
AA9PB	94,359	537	57	14
WA9TZE	34,000	223	58	10
NI9C*	26,572	212	48	4
W9WUU*	21,070	190	48	1
KB9Q*	19,485	194	45	0
KB9S*	16,515	161	45	0
K9XJ*	12,474	132	42	0
K9OSH*	5,890	80	31	0

COLORADO

AAØRS	**288,500**	**990**	**59**	**41**
K8FC	**104,317**	**596**	**56**	**17**
K6XT*	**30,804**	**258**	**48**	**3**
KØRI	23,001	193	48	3
WUØL/QRP	**11,362**	**136**	**38**	**0**
WØRMA*	9,321	105	38	1
WØZP*	8,712	106	35	1
WVØH*	6,726	73	36	2
KD5LX/QRP	6,052	80	34	0
KBØYH/QRP	4,154	64	31	0
NØTK/QRP	1,072	32	16	0
WØETT*	720	11	0	9

IOWA

K4IO	**58,278**	**354**	**55**	**11**
WØETC/QRP	**14,432**	**136**	**43**	**1**
KØSRL*	**11,550**	**119**	**42**	**0**
NØAC*	4,814	77	29	0
WYØV	3,000	55	24	0
WAØIAF*	96	8	16	0

KANSAS

WS4Y	**89,034**	**521**	**56**	**15**
WØBH*	**58,752**	**498**	**53**	**1**
WØUY	37,392	270	51	6
KØPY	34,079	284	48	5
KØBJ*	22,792	170	51	5
NØXM	6,970	98	34	0
KFØXV/QRP	**5,406**	**72**	**34**	**0**
NØUU*	5,285	71	35	0
WØRT	3,608	22	6	16

MINNESOTA

KØCAT	**146,331**	**898**	**59**	**12**
WØHW	87,003	602	56	7
NØAT	73,728	480	57	7
ACØW*	**54,752**	**411**	**55**	**4**
WØZR*	54,369	370	56	7
KØIR	47,849	342	53	6
K4IU	42,952	301	54	5
KØKX*	34,045	258	50	5
KØAD*	31,590	248	52	2
KNØV*	30,576	257	50	2
WA2MNO*	27,948	244	51	0
KIØF*	9,430	99	40	1
KØMPH*	5,148	66	33	0

MISSOURI

KU1CW	**337,080**	**1164**	**59**	**47**
AE9B	138,942	659	56	27
WØTT	56,606	399	54	8
WØCH/QRP	**15,356**	**156**	**41**	**3**
KØLWV*	1,872	52	18	0
NØOCT/QRP	552	23	12	0

NORTH DAKOTA

WØCZ/QRP	**2,350**	**41**	**25**	**0**

NEBRASKA

W7DRA/8*	**35,343**	**306**	**50**	**1**
KGØGY*	19,642	181	45	1
WNØL*	10,045	112	41	0
WBØM	9,030	97	42	0

SOUTH DAKOTA

K7RE*	**83,753**	**613**	**56**	**5**
KØHW*	36,774	290	49	5
KDØS*	28,362	197	53	5

CANADA

NEWFOUNDLAND

VO1HP	**255,330**	**418**	**46**	**44**

NEW BRUNSWICK

VE9DX*	**98,410**	**303**	**51**	**14**

NOVA SCOTIA

VE1AI	**183,352**	**402**	**50**	**32**

QUEBEC

VE2IM	**479,325**	**780**	**59**	**46**
VE2AWR*	**59,731**	**257**	**46**	**3**
VE2FK*	9,128	71	26	2

ONTARIO

VE3AT	**620,000**	**1187**	**58**	**42**
VE3PN	**305,970**	**580**	**56**	**37**
VE3QAA	277,502	608	58	31
VE3CSK*	**265,926**	**653**	**58**	**24**
VE3OSZ*	227,120	576	58	22
VE3KP*	192,223	594	58	9
VE3FU*	183,677	539	59	12
VA3NR*	138,560	452	55	9
VE3MGY/QRP	**124,310**	**419**	**56**	**6**
VE3JAQ*	111,038	395	54	5
VE3GLO*	86,845	336	51	4
VE3KZ	78,192	301	49	5
VE3RER*	63,250	267	49	1
VA3EC*	60,576	271	48	0
VE3BNO*	44,492	192	46	3
VE3RZ*	44,118	219	43	0
VE3EBN*	37,800	180	44	1
VE3XB*	36,363	152	42	9
VE3WG*	35,240	187	39	1
VE3HG*	22,350	158	30	0
VE3OBU	22,116	120	38	0
VE3XAT*	21,607	112	41	0
VE3UZ	21,204	125	36	0
VE3OZB/QRP	7,280	65	25	1
VA3IX	3,948	39	21	0
VA3OR*	1,170	27	10	0

MANITOBA

VE4YU*	**7,047**	**54**	**29**	**0**

SASKATCHEWAN

VE5UF*	**184,405**	**589**	**56**	**9**
VA5DX	145,464	530	52	5
VA5SAM*	19,092	96	43	0

ALBERTA

VE6EX*	**150,700**	**567**	**50**	**5**

BRITISH COLUMBIA

VE7CC	**208,437**	**597**	**54**	**13**
VE7UF	**196,416**	**564**	**55**	**11**
VA7ST*	**87,642**	**340**	**51**	**3**
VE7WU*	39,366	148	48	6
VE7ALN*	29,040	138	41	3
VE7JKZ	26,110	152	32	3
VA7MM	14,508	120	26	0
VA7CAB*	2,736	39	16	0

ALASKA

AL1G	**4,956**	**69**	**12**	**2**

ANGUILLA

VP2E	**889,014**	**1135**	**58**	**64**

BRITISH VIRGIN IS

VP2V/W3HQ/Q	**5,500**	**42**	**20**	**5**

CUBA

CO2CI*	**57,840**	**239**	**45**	**3**

MEXICO

XE1V	**83,328**	**244**	**47**	**17**
XE2TG*	**41,145**	**211**	**39**	**0**

TURKS & CAICOS

VP5/K9NW*	**128,340**	**359**	**51**	**18**

US VIRGIN IS

KP2ZZ	**723,492**	**1038**	**56**	**60**

AFRICA

AFRICAN ITALY

IH9GPI	**463,445**	**787**	**6**	**53**
EA8ZS	**123,504**	**202**	**30**	**32**
EA8AHB*	**37,222**	**105**	**3**	**34**

CANARY ISLANDS

CAPE VERDE IS

D4B	**2,919,714**	**1995**	**56**	**91**

MADERIA IS

CT3BH	**277,992**	**321**	**32**	**56**

ASIA

ASIATIC RUSSIA

RG9A	**550,830**	**865**	**0**	**70**
UA9CLB	**400,526**	**642**	**0**	**67**
RX9AM*	**181,611**	**393**	**0**	**51**
UA9CR*	176,743	389	0	49
UA9SP*	146,340	304	1	53
UA9YAB	126,312	284	2	55
UA9AX*	106,306	260	0	46
RV9XM	98,384	248	0	43
UAØANW	91,238	227	0	49
UA9CBR*	55,770	194	0	33
RX9JX*	54,981	153	0	41
UA9MA	53,460	172	1	35
RX9TX	38,160	144	0	30
RN9AS*	33,762	113	0	34
RK9JWV*	29,986	126	0	29
UA9ADW*	28,104	134	0	24
RUØAW*	21,242	99	0	26
UAØDC	19,008	169	6	12
UAØAGI	18,956	89	0	28
UAØAZ	14,674	80	0	22
UAØLCZ*	13,300	123	6	13
UAØACG	10,241	68	0	19
UA9MQR*	9,006	65	0	19
RV9WZ	6,578	34	0	22
RUØAT	5,920	59	0	16
UAØSC	3,146	46	0	11
RW9WW*	1,620	36	0	6
UA9OS*	1,548	29	0	9
RZ9WXW	1,285	36	0	5
RAØLK*	1,044	36	0	6
RAØBA	581	13	0	7
RAØLL*	36	3	0	3

CHINA

BA4DW	**27,040**	**110**	**8**	**24**

CYPRUS

5B/K3UY	**846,769**	**1154**	**0**	**77**
C4M/QRP	**280,920**	**483**	**3**	**57**

GEORGIA

4L2M*	**333,685**	**627**	**3**	**52**

HONG KONG

VR2BG	**20,746**	**147**	**4**	**19**

IRAQ

YI9VCQ*	**11,201**	**56**	**0**	**23**

ISRAEL

4Z5MU*	**18,720**	**63**	**1**	**31**

JAPAN

JH4UYB	**190,092**	**382**	**14**	**48**
JA6GCE	85,644	220	11	41
JA7NI	67,230	202	12	33
JH3AIU	41,648	161	13	25
JEØVJV	20,910	74	13	21
JA7IC	17,160	97	11	15
JA1CMD/Ø*	**14,364**	**72**	**10**	**17**
JO7KMB	7,560	60	9	11
JH3SIF*	4,369	31	7	10
JH7XMO*	3,920	48	9	7
JA1CP*	2,266	41	8	3
JH1GVY*	1,530	28	5	5
JN2QCV*	1,250	28	3	7
JG3VEI/1*	1,008	13	5	4
JG3WCZ*	200	6	1	4
JA1HTG*	135	17	1	2
7K1CPT/1/QRP	129	17	0	3
JP1SRG*	96	10	0	3
JA1XPU*	26	13	0	1
JK2VOC*	10	5	0	1

KAZAKHSTAN

UN9LW	**632,520**	**926**	**1**	**71**
UO2M*	**133,938**	**332**	**0**	**42**
UN5J	99,968	254	0	44
UN7JX*	84,612	213	0	44
UN7GM	30	2	0	2

KOREA

DS5KJR*	**5,764**	**100**	**5**	**6**
HL5UOG*	717	49	0	3

KYRGYZSTAN

EXØM	**33,984**	**130**	**0**	**32**
EX2A*	**24,084**	**97**	**0**	**27**

MONGOLIA

JT1CO	**95,850**	**291**	**3**	**42**

SAUDI ABABIA

HZ1EX*	175	5	0	5

SINGAPORE

9V1GO	**50,112**	**119**	**5**	**43**

TAJIKISTAN

EY8CQ	**24,335**	**85**	**0**	**31**
EY8MM*	1,050	14	0	10

TURKEY

TA9J*	**2,820**	**25**	**0**	**12**

UNITED ARAB EMIRATES

A61AJ	**706,160**	**940**	**8**	**72**

UK BASES CYPRUS

ZC4LI*	**91,200**	**234**	**0**	**40**

UZBEKISTAN

UK9AA*	**15,240**	**74**	**0**	**24**

VIETNAM

XW3DT	**480**	**9**	**1**	**7**

EUROPE

AUSTRIA

OE8CIQ	**237,250**	**694**	**9**	**56**
OE4PWW*	116,706	425	4	49
OE1ZKC	76,608	306	4	44
OE50CWL*	48,279	290	0	33

BELGIUM

ON4WW	**995,562**	**1353**	**43**	**80**
OO6CC	**283,591**	**674**	**20**	**57**
OO6AB*	**123,228**	**368**	**12**	**51**
ON4BR	108,801	318	13	50
ON6LY*	48,048	184	10	38
ON7YX*	42,983	136	11	42
OO6TJ*	17,429	124	0	29
OO5JD*	10,948	79	0	28

BELARUS

EU1AZ	**225,396**	**803**	**0**	**54**
EU1PA	**207,735**	**717**	**0**	**55**
EV6M	150,603	554	0	51
EW8EW	146,418	604	0	46
EW3LN	88,704	352	0	48
EU1AI*	**83,104**	**318**	**1**	**48**
EU6EU	77,161	161	12	61
EW8CY*	53,206	284	0	37
EW8WF	8,712	79	0	22

BULGARIA

LZ9W	**400,950**	**925**	**16**	**65**
LZ2DF*	**165,532**	**547**	**3**	**55**
LZ9R*	143,046	507	1	53
LZ1AQ	135,051	432	2	57
LZ2UZ*	41,220	221	0	36
LZ3SM*	9,039	77	0	23

CRETE

SVØXAI/9*	**12,742**	**112**	**0**	**23**

CROATIA

9A5W	**553,870**	**1019**	**24**	**73**
9A2AJ	537,962	1025	23	71
9A4W	251,840	759	7	57
9A3RE*	**206,851**	**660**	**9**	**52**
9A4RC*	47,560	242	0	40
9A6C*	23,744	152	0	32

CZECH REPUBLIC

OK1RF	**1,011,125**	**1376**	**46**	**79**
OL8R	**364,572**	**933**	**14**	**64**
OK1AVY	347,040	862	17	63
OK1MR	344,988	806	19	65
OK1TP	311,339	734	18	61
OK1CF*	**280,024**	**856**	**11**	**57**
OK1FDY	266,492	782	12	56
OK1IW	244,596	755	14	52
OK1EP	236,082	637	17	56
OK1WF*	201,900	705	4	56
OK1PI*	200,184	744	3	54
OK1DCF*	182,460	627	7	53
OK1DT	169,884	521	11	55
OK2BQL*	148,032	463	10	54
OK1MNW*	144,845	503	4	55
OK1JOK*	132,944	493	3	53
OK2AB*	131,065	503	6	49
OK1MQ*	125,150	537	0	50
OK1AY*	121,150	523	0	50
OK2PVF	116,889	528	0	47
OK1TC*	112,513	387	8	51
OK1AYY	112,080	494	2	46
OK2PWJ	107,880	379	6	52
OK2BZ	104,040	344	5	55
OK1DOL*	103,836	430	1	50
OK2EC*	102,596	414	2	50
OK1FKD/QRP	**102,250**	**445**	**1**	**49**
OK1FC*	101,200	381	3	52
OK1HX*	100,859	404	4	49
OL6P*	98,450	420	1	49
OK2PHC*	94,692	384	0	52
OK1AOV*	94,308	332	7	51
OK2DU*	93,765	423	1	46
OK2BYH*	92,144	374	2	50
OK1DKR*	92,070	336	8	47
OLØA*	84,816	365	2	46
OK1ZCW*	77,469	322	1	50
OK2PBG*	73,650	310	1	49
OL6M*	70,720	280	3	49
OK1MZO*	68,646	287	2	49
OK1FHI*	67,633	310	0	47
OK2PMS	66,194	302	0	46
OK1VBA*	65,394	337	0	42
OK2TRN*	59,904	334	0	39
OK1XJ	57,120	253	4	44
OK1DKO*	52,589	265	0	43
OK2EQ*	51,042	223	2	45
OK2BEM*	50,232	226	0	46
OK2SG	49,296	203	5	43
OK2GG	47,080	230	1	43
OK1NE	43,563	244	2	37
OK1ARN*	41,004	256	0	36
OK1DOF*	37,392	218	2	36
OK1DXD*	36,090	164	0	45
OK1VD*	33,552	202	0	36
OK1DXK*	33,435	151	4	41
OK1JOC/QRP	29,988	178	0	36
OK1KZ*	25,576	180	0	32
OK1ARO*	25,440	166	0	32
OK2WH*	24,660	180	0	30
OK1DVK	9,954	42	0	42
OK1ANP*	9,222	66	1	28
OK1LO*	8,592	83	0	24
OK1XC	8,190	35	9	17
OK6A*	1,190	14	0	14
OK1DDV/P/QRP	14	2	0	2

DENMARK

OZ5WQ	**156,709**	**488**	**12**	**49**
OZ8AE*	**87,924**	**329**	**3**	**48**
OZ4O	79,674	309	2	47
OZ5DX*	23,088	115	0	39
OZ5UR*	4,305	40	1	20
OZ1DGQ*	45	3	0	3

ENGLAND

M2D	**775,284**	**1176**	**44**	**62**
G3XTT	**315,128**	**635**	**27**	**61**
G3AB	295,650	728	20	55
MØSDX	199,155	525	16	55
MØDHO*	**178,880**	**533**	**13**	**51**
M3C*	132,850	529	4	46
G4BJM	123,584	334	24	40
G3GLL	84,912	255	13	48
G3RLE*	38,857	148	6	43
GØDCK/QRP	**34,236**	**192**	**1**	**35**
G3KNU*	25,296	164	1	30
G3YMC/QRP	21,088	138	2	30
G3JJZ*	20,889	128	2	31

ESTONIA

ES2DJ	**269,206**	**754**	**7**	**60**
ES6PZ*	**64,371**	**285**	**0**	**43**
ES6KW*	34,992	192	0	36

FAROE ISLAND

OY1CT	**117,607**	**437**	**2**	**51**

FINLAND

OH5NE	**97,450**	**370**	**3**	**47**
OH2BO	77,467	239	3	56
OH3RR	60,843	220	3	48
OH3JR	57,936	212	1	50
OH3WD	46,848	172	3	48
OH5UFO*	**30,976**	**129**	**0**	**44**
OH2FS*	3,335	28	0	23
OH1BOI*	320	8	0	8
OH1UP*	140	7	0	4
OH2BYS	45	3	0	3

FRANCE

F5IN	**476,550**	**914**	**31**	**59**
F5BBD	100,064	320	9	50
F5INJ*	**21,490**	**116**	**6**	**29**
F6FTB*	7,061	59	1	22

GERMANY

DL3TD	**750,348**	**1256**	**40**	**74**
DL5XU	**606,708**	**996**	**35**	**79**
DK8ZB	585,396	1049	35	66
DK6WL	569,504	1047	33	71
DJØMDR	459,732	1004	26	65
DK2OY	380,926	842	27	64
DFØCG	366,010	840	26	59
DL9EE	297,970	714	20	63
DL3NCI	293,250	678	26	59
DJ6TK	284,508	657	20	64
DL2JRM	257,012	859	6	61
DL2RMC	241,010	728	14	56
DL5YM*	**198,084**	**602**	**15**	**53**
DF8AA	173,362	606	6	55
DL2ZAE*	165,685	532	11	54
DL5JS	164,787	601	9	50
DL4CF	153,972	498	10	53
DL8DYL	130,851	399	15	52
DL1RG*	117,852	405	7	54
DJ6BQ*	112,678	441	4	49
DL1YD*	112,041	372	13	46
DJ4SN*	109,460	477	1	51
DL4WA*	108,069	471	3	48
DL7URH	103,455	391	6	49
DL5LYM	103,350	434	4	46
DJ5MW	96,301	394	0	53
DF3KV/QRP	**86,408**	**319**	**8**	**48**
DL4WG	82,992	323	8	44
DL1MAJ*	81,500	345	3	47
DL6LAU	80,738	169	21	52
DL1JF*	78,456	281	6	50
DL2RUG*	77,272	300	2	50
DL2FDL*	76,798	412	1	42
DK5WL	71,685	242	10	49
DK3LM*	66,308	344	0	44
DF1LON*	65,001	305	1	46
DJ2ZS*	52,946	248	3	43
DL9DRA	51,251	196	7	46
DL3ZAI*	49,476	267	0	42
DK3QZ*	48,000	270	3	37
DL9NDS*	44,142	223	0	42
DJØIP*	43,065	211	0	45
DL5SVB*	42,886	228	0	41
DL8MBS/QRP	41,876	245	0	38
DL3DRN*	41,706	206	1	41
DL8DWW*	41,220	255	0	36
DLØDX	40,404	249	1	36
DL8NBE*	39,680	213	0	40
DK3YD	39,312	236	0	39
DL4RCK*	38,764	197	1	43
DK3GI*	37,400	197	0	40
DK9TN	37,044	232	0	36
DK4YJ*	36,540	224	0	36
DL1BZA*	36,176	214	0	38
DL1BUG*	35,631	205	0	37
DL4LQM	34,379	250	0	31
DL6NCY*	34,142	167	0	43
DK6CQ*	33,180	207	0	35
DJ8QP*	32,760	184	0	39
DK9KW*	32,522	150	0	46
DF1IAQ*	32,520	173	3	37
DJ5IW*	32,486	194	0	37
DLØVLA*	30,666	175	0	38
DF7DJ*	30,345	192	0	35
DJ1AA/QRP	29,725	157	2	39
DJ2YE*	29,444	194	0	34
DK2BJ*	29,374	168	0	38
DF6PB*	28,952	115	5	42
DL1TPY*	28,918	166	0	38
DL1IA*	27,675	134	0	41
DK3AX*	27,343	159	0	37
DL1SAN*	26,452	166	0	34
DM5TI	26,058	109	8	35
DL6ZNG*	26,028	157	0	36
DKØMN	25,288	202	0	29
DL1BUT*	25,164	144	0	36
DL2OBO*	25,026	111	4	39
DJ8OG*	23,829	131	1	38
DL9NCR*	22,880	155	0	32
DK7FP*	22,242	146	2	31
DJ2SL*	21,910	134	0	35
DLØFR*	19,840	135	0	32
DF6WE*	18,390	143	0	30
DL9GHT*	18,120	134	0	30
DL3BRA*	17,700	133	0	30
DK3WJ*	17,306	114	0	34
DL1NEO	16,770	122	0	30
DK8EY*	15,810	111	0	30
DL1YFF*	15,444	101	1	32
DJ3IW*	14,532	119	0	28
DL5MO*	14,518	90	0	34
DJ5IR*	14,476	112	0	28
DJ8MT	13,851	120	0	27
DL1KUR*	12,480	113	0	24
DL3ARK*	12,210	86	0	30
DK3UA*	11,820	77	0	30

DL1RTL*	10,989	90	1	26
DL6FCB/QRP	10,465	106	0	23
DJ3GE/QRP	10,097	91	0	23
DL5RBR*	9,959	94	0	23
DL2ZA*	8,840	101	0	20
DL2NBY*	7,458	78	0	22
DL9UJF*	5,964	64	0	21
DL1BBO/QRP	5,820	66	0	20
DL2YED*	5,040	68	0	18
DL6RBH*	4,248	54	0	18
DL8HCO*	4,237	50	0	19
DL4KUG/QRP	4,140	45	0	20
DL9NDV*	3,952	44	0	19
DK7AN*	3,690	46	0	18
DL1LPY*	3,220	34	0	20
DL2LAR*	2,242	26	0	19
DL2AXM*	2,100	36	0	14
DJ5NN*	1,694	26	0	14
DH7AMF*	891	24	0	9
DF2FM/QRP	224	7	0	7
GREECE				
SV1/LY1DF*	**278,144**	**838**	**7**	**57**
SV1RP	185,136	618	4	53
SV1BFW*	4,620	40	0	21
HUNGARY				
HA8DU	**855,972**	**1212**	**37**	**81**
HA8JV	**603,680**	**1112**	**22**	**76**
HG8L	470,390	1029	14	71
HA5NL*	**251,505**	**700**	**7**	**62**
HA1CW*	191,574	652	6	52
HA8VK	170,964	622	4	50
HA8IH*	144,266	532	3	50
HA1ZZ/QRP	**125,875**	**474**	**4**	**49**
HA8DZ	123,015	398	6	53
HADHW*	51,686	242	0	43
HA6IAM/QRP	35,700	217	0	34
HA9SU*	26,586	120	2	40
HADLG	18,507	122	0	31
HA1ZN*	10,764	96	1	22
HA2MN/5*	8,928	75	0	24
IRELAND				
EI6IZ	**301,529**	**647**	**29**	**51**
EI9JN*	**26,565**	**147**	**3**	**32**
ITALY				
IN3QBR	**291,915**	**879**	**11**	**54**
I2PJA	**229,824**	**522**	**22**	**54**
IK3SSO*	**104,481**	**354**	**7**	**50**
I2SVA	82,945	307	4	49
IK4XCL*	61,605	268	2	43
IK4VET	56,588	223	9	38
I2AZ*	48,585	238	0	41
IK4DCS*	46,397	208	4	39
IK2ADO	30,022	178	1	33
I4JEE*	1,782	20	0	18
IBQM/QRP	51	4	0	3
JERSEY				
MJ0AWR	**357,352**	**890**	**21**	**55**
KALININGRAD				
UA2CZ*	1,564	19	0	17
LATVIA				
YL2KO	**459,654**	**995**	**11**	**72**
YL5M*	**87,952**	**371**	**0**	**35**
YL2LY*	81,634	319	2	47
YL2CR*	48,320	239	0	40
YL2GD	47,840	172	3	49
YL2PP*	28,244	112	1	45
YL3GCU*	18,032	128	0	28
YL2TW*	16,698	100	0	33
YL5W/QRP	**9,482**	**85**	**0**	**22**
LITHUANIA				
LY7Z	**735,280**	**1220**	**24**	**80**
LY3UM	**645,120**	**1072**	**27**	**78**
LY4A	632,828	1204	22	75
LY3BW	293,181	804	9	60
LY3BA	252,480	816	5	55
LY2OU	194,648	648	4	54
LY2HK*	**135,975**	**543**	**2**	**47**
LY5R	111,100	379	6	49
LY4BF*	91,308	431	0	42
LY2OO*	90,895	365	1	48
LY2TE*	88,322	411	0	43
LY2FN*	75,901	302	1	48
LY2OM*	61,446	290	0	42
LY3BU	46,794	278	0	33
LY1CT*	37,986	195	0	39
LY2LE	36,888	102	2	56
LY2FE/QRP	**31,265**	**169**	**0**	**37**
LY2IC*	16,414	117	0	29
LY2BOS*	2,775	40	0	15
LUXEMBOURG				
LX1RQ*	**8,964**	**66**	**0**	**27**
MALTA				
9H1ZA	**460,404**	**966**	**20**	**67**
MOLDOVA				
ER5GB*	**262,683**	**698**	**7**	**62**
NETHERLANDS				
PA0LOU	**198,706**	**505**	**15**	**58**
PA5WT*	**42,927**	**209**	**1**	**40**
PA3AAV*	32,120	158	0	40
PA0JED*	30,342	148	8	31
PA0MIR*	24,222	147	1	32
PA7RA*	20,480	128	0	32
PA3BFH*	12,584	97	0	26
PA3HGF*	11,950	98	0	25
PG7V*	9,504	76	5	19
PA0JNH	9,128	67	0	28
PA3CNI*	8,568	42	8	26
PA3CVY*	5,304	39	3	23
PA1W/QRP	**4,731**	**51**	**0**	**19**
PA3ADJ*	3,216	41	0	16
PA0RBO/QRP	1,440	24	0	12
NORWAY				
LA3BQ*	**88,785**	**387**	**0**	**45**
LA2O	72,880	358	1	39
LA8WG*	31,312	160	0	38
LA1PHA*	100	5	0	4

POLAND				
SN7Q	**1,094,828**	**1470**	**42**	**80**
SP4Z	**262,080**	**602**	**16**	**64**
SP6A	247,105	631	17	56
SN2N*	**213,108**	**711**	**0**	**59**
SQ4MP*	196,683	740	0	53
SP8NR*	183,860	625	5	53
SP2QG	167,035	606	3	52
SP7JQQ	163,907	517	9	52
SP7HKK*	136,612	563	0	49
SN8F/QRP	**128,790**	**489**	**1**	**52**
SP2HMT*	110,136	413	1	51
SP6BEN*	104,200	410	0	50
SP6IHE*	100,464	370	5	47
SQ9FMU*	84,364	368	0	46
SP6GJY*	73,392	332	1	43
SP9GR*	68,112	309	1	43
SP5TAT*	67,500	299	2	43
SP6CZ	64,612	201	3	55
SP1DTG*	55,704	249	0	44
SP4GFG/QRP	54,080	272	0	40
SP6T*	49,960	251	0	40
SP2DNI*	49,742	267	0	38
SP9RTI*	47,880	232	0	40
SQ9IDE*	41,106	245	0	34
SP1EK*	39,431	176	0	43
SN1A*	37,260	164	0	46
SP4GHL*	35,196	164	0	42
SO1VAF	28,356	167	0	34
SQ7B	27,180	151	0	36
SP9W/QRP	21,840	145	0	30
SP5GH	17,376	57	1	47
SP5BYC*	16,095	109	0	29
SP8FHJ*	15,938	127	0	26
SP4AAZ*	11,564	85	0	28
SP5CJY*	4,860	54	0	18
HF8IARU/QRP	2,338	34	0	14
SQ1EJD	1,470	18	0	14
SP8QED/QRP	536	14	0	8
SP6AEG	75	3	0	3
PORTUGAL				
CT1FJK	**618,901**	**845**	**46**	**67**
CT1ILT	198,198	452	22	56
CT1FNT*	**6,942**	**49**	**0**	**26**
ROMANIA				
YR2I	**571,710**	**1089**	**23**	**72**
YR5O	**293,556**	**828**	**13**	**55**
YO3BWK*	38,184	173	0	43
YO7BGA	37,740	220	0	34
YO8MI*	18,502	132	0	29
YO4BBH*	18,120	120	0	30
YO4AAC/QRP	**2,296**	**33**	**0**	**14**
YO9FYP*	1,547	24	0	13
YO6ADW*	364	11	0	7
RUSSIA				
RA6AX	**645,150**	**993**	**32**	**78**
UA6LV	**408,400**	**726**	**23**	**77**
RW4PL	398,735	822	9	76
RD3A	365,175	944	3	72
UA3DPX	303,252	788	3	71
RX4HZ	283,899	715	2	75
RZ6AZZ	236,304	605	7	65
RU3DX	206,505	630	2	63
RZ4FA*	**193,472**	**589**	**1**	**63**
RV1CC	177,120	602	3	57
UA1OMS	174,845	640	0	55
RW4FZ	164,197	549	0	59
RZ3DX	150,684	510	0	58
UA6LFQ*	142,615	522	1	54
UA4LY	134,048	436	0	59
UA3MIF	128,472	487	0	53
RW3GB*	121,110	443	0	55
UA3SAQ*	103,500	425	0	50
RU1AO	99,900	327	1	59
RU4WW*	97,450	382	0	50
RD4WA	92,592	383	0	48
RN6FK	89,726	302	3	55
RZ4CWW	85,250	296	0	55
RU6FA*	84,600	341	0	50
UA3AP	80,213	326	0	49
RK4HD*	76,896	319	0	48
RW3DW*	73,048	331	0	46
RV3LO*	71,961	265	0	51
UA6AF	65,394	175	11	52
RA3UAG*	62,606	269	0	46
RV4AB*	60,368	241	1	48
RU4LM	59,486	230	0	49
RA1QX*	54,756	293	0	39
RU3DM*	53,459	210	0	49
RX3AEX	51,402	268	0	39
UA4FEN*	48,906	264	0	38
RA6GW*	47,344	210	0	44
RA1QY*	45,591	243	0	39
RV3FI*	45,324	272	0	36
RW3AI/QRP	**44,820**	**262**	**0**	**36**
RW3XZ*	42,365	236	0	37
RA4HBS*	41,106	239	0	34
RU4CO	39,520	195	0	40
RW4FO*	37,653	237	0	33
RW4PY*	34,554	170	0	39
UA3ICK*	31,392	181	0	36
UA1CBM*	30,261	202	0	33
RW3GU	28,548	161	0	36
RA1OD*	28,424	142	0	38
RA1ACY*	27,208	153	0	38
UA3PW*	26,486	149	0	38
RU6YY	25,422	70	1	56
RK3WWA*	22,330	164	0	29
RA3NZ*	20,638	117	0	34
UA3TCJ	18,690	102	0	35
RZ3AV	17,193	107	0	33
RU3WR*	14,248	118	0	26
UA6JFG	12,366	89	0	27
RK6MY*	9,548	99	0	22
UA6HON	8,866	84	0	22
RZ3VA*	7,974	99	0	18
UA1ORT	7,634	70	0	22
UA3RC*	6,180	65	0	20
RV1AT	4,896	59	0	18
UA6BAE*	1,736	24	0	14
RA4NCC*	1,242	40	0	6
RA4FJV*	1,106	16	0	14
UA3XGM	996	17	0	12
UA3AAP/QRP	2	1	0	1
SARDINIA				
IS0OMH*	**13,340**	**89**	**0**	**29**

SCOTLAND				
GM2W	**61,429**	**251**	**4**	**43**
GM8OEG*	**8,294**	**75**	**0**	**22**
SERBIA				
YU7AV	**743,864**	**1187**	**31**	**76**
4N8W*	**275,136**	**817**	**6**	**58**
YT2W*	151,620	523	4	53
YU1JW*	135,407	574	1	46
4N1N*	107,088	436	2	46
YU1KT*	33,510	231	0	30
YT6Y*	14,690	118	0	26
YT0T*	13,427	92	0	29
YU1LM/QRP	**2,842**	**46**	**0**	**14**
YU1UA*	1,287	14	0	13
SICILY				
IT9DEC/QRP	390	13	0	6
SLOVAKIA				
OM7CW	**323,196**	**897**	**5**	**64**
OM7JG	**317,520**	**859**	**14**	**56**
OM4EX	240,108	695	13	53
OM7DX/QRP	**220,311**	**688**	**6**	**57**
OM3OM*	**212,781**	**722**	**2**	**55**
OM0TT*	138,435	509	3	52
OM3ROM*	94,570	386	2	47
OM4DN*	91,080	401	0	46
OM3BA*	61,864	284	0	44
OM/HA8KW*	59,490	261	1	44
OM5UM*	47,936	312	0	32
OM7AG*	47,520	299	0	33
OM4JD*	43,089	147	2	51
OM1AW*	42,680	191	2	42
OM3CDN*	30,673	173	0	37
OM3TLE/QRP	23,910	164	0	30
OM6AL*	19,500	162	0	25
OM4AMA*	11,568	100	0	24
SLOVENIA				
S57DX	**554,600**	**1082**	**21**	**73**
S57M	**528,600**	**945**	**27**	**73**
S53O	498,387	971	22	71
S53XX	366,955	862	20	59
S54X	165,753	507	10	53
S50A	147,630	384	18	52
S56A	147,264	485	5	54
S51NZ*	**147,212**	**569**	**1**	**51**
S59W*	114,513	383	5	52
S57AL*	114,088	434	2	50
S51VI*	71,664	296	0	48
S57J*	57,291	302	0	39
S57U*	52,065	236	0	45
S57NAW*	32,769	198	0	33
SPAIN				
EA5FID	**221,195**	**462**	**23**	**60**
EA7NW*	**127,946**	**293**	**21**	**53**
EA7AJR*	50,694	175	11	40
EA4NP*	35,506	165	1	40
EA2BNU*	9,464	73	0	26
EA7RM*	4,120	41	0	20
EA5AIO*	2,244	27	0	17
EA5XQ*	2,025	27	0	15
EA7CA*	1,989	22	0	17
SWEDEN				
7S2E	**246,264**	**763**	**8**	**54**
SM5CCE	38,380	199	0	38
8S0W*	**34,916**	**151**	**1**	**42**
SM4F	12,288	67	1	31
SM5ARL*	11,488	72	0	32
SM7BJW*	11,232	86	0	26
SM4XIH*	6,076	42	0	28
SWITZERLAND				
HB9CIP	**110,971**	**207**	**20**	**63**
HB9SVT*	**16,212**	**115**	**0**	**28**
HB9HQX*	9,724	88	0	22
UKRAINE				
UW2M	**368,145**	**808**	**9**	**72**
UW5U*	**245,574**	**763**	**7**	**56**
UY5ZZ	212,840	611	2	66
UT5DL*	198,185	589	11	54
UT7QF	194,972	435	10	69
UY0ZG	186,027	623	1	58
UX5NQ*	183,433	693	4	49
UT4ZG	150,984	556	0	54
UT2UB	149,301	565	1	52
US0ZZ	148,740	424	6	61
UR8RF*	148,143	515	2	55
UT1FA*	147,852	549	2	52
UX0IB*	137,368	464	5	51
UR7EQ*	134,836	522	0	52
UV5U	116,740	443	0	52
UR5MID	103,113	342	4	53
US0KW/QRP	**102,192**	**423**	**0**	**48**
UZ5U	101,655	456	0	45
UU5WW	94,521	387	2	47
UR6IJ*	89,148	344	2	49
US0IV	87,705	378	0	45
UR3MP*	87,408	350	3	45
UR4MV*	85,146	368	0	46
US3IZ*	83,650	332	1	49
US5II	81,169	338	0	47
UT3N*	66,204	385	0	36
UT5ECZ	62,361	309	0	41
US6IMA*	59,805	264	0	45
UY5TE*	59,358	311	0	39
UR7IA	47,518	199	1	45
US4EX*	46,472	252	0	37
UR5LCZ*	37,740	205	0	37
UT8IO*	36,138	181	0	38
US1IV*	35,100	194	0	36
UR8IF*	23,680	144	0	32
UT5UGR	21,248	133	0	32
UT2UZ	19,318	149	0	26
UT7GX*	17,864	126	0	29
UT2QQ*	8,820	59	0	30
US0QG*	2,664	34	0	18
UR5ZQV*	1,885	29	0	13
UT5JAB*	1,540	31	0	11
UT5UGQ*	1,320	30	0	11
UT5UNA/QRP	1,209	20	0	13
UT2UY	630	17	0	9
WALES				
GW3JXN	**371,712**	**743**	**30**	**58**
GW4ALG/QRP	**1,911**	**29**	**1**	**12**

OCEANIA

AUSTRALIA				
VK2GR	**1,885**	**21**	**4**	**9**
HAWAII				
NH6KB	**113,114**	**248**	**41**	**5**
INDONESIA				
YE8X	**84,042**	**207**	**0**	**42**
YB0UNC*	576	9	0	8
N. MARIANAS				
WH0V	**10,305**	**71**	**4**	**11**

SOUTH AMERICA

BRAZIL				
PY2NY*	30	2	0	2
COLOMBIA				
HK1XX	**100,250**	**203**	**35**	**15**
CURACAO				
PJ2T	**937,073**	**869**	**56**	**53**
VENEZUELA				
YV5MBX	**80,676**	**152**	**39**	**15**
YV5LIX*	**8,372**	**34**	**12**	**14**

CW MULTI-OPERATOR NORTH AMERICA

UNITED STATES

CONNECTICUT				
NZ1U	**26,892**	**115**	**33**	**21**
MASSACHUSETTS				
K1TTT	**669,600**	**1468**	**59**	**61**
W1QA	159,885	428	53	42
NF1A	21,100	136	38	12
K1RV	585	21	13	0
NEW HAMPSHIRE				
KC1XX	**704,970**	**1313**	**59**	**67**
K0TV	341,279	916	56	45
RHODE ISLAND				
K1LT	**151,478**	**574**	**57**	**32**
W1OP	36,081	221	43	14
NEW JERSEY				
W2GD	**794,766**	**1438**	**59**	**68**
N2NT	526,010	1214	58	57
NO2R	362,096	850	56	56
N2MM	200,784	646	58	36
K2OWE	1,824	51	16	0
NEW YORK				
K2NV	**55,512**	**198**	**45**	**27**
AA2GF	44,781	295	47	12
K2QMF	36,729	172	30	23
N2VW	11,603	118	38	3
DISTRICT OF COLUMBIA				
4U1WB	840	30	14	0
MARYLAND				
KT3Y	**433,998**	**1171**	**59**	**55**
K3DI	176,970	790	59	26
W3SO	111,390	518	56	23
W3UL	7,840	109	32	0
PENNSYLVANIA				
K3WW	**374,074**	**1069**	**59**	**47**
W8FJ	**265,928**	**668**	**58**	**46**
N3RS	220,077	605	57	42
KF3B	192,288	551	54	42
NN3Q	111,881	490	50	27
AA3B	87,532	357	54	25
K3SV	40,755	259	42	15
W3FV	38,308	222	45	16
K3OO	31,096	197	29	17
N3ZA	7,360	74	23	9
K3NM	6,396	37	9	17
FLORIDA				
N4WW	**339,825**	**818**	**59**	**56**
GEORGIA				
N4GG	**51,272**	**378**	**49**	**9**
NORTH CAROLINA				
W0UCE	**248,682**	**983**	**56**	**37**
K4HA	196,084	733	59	35
K3KO	44,226	346	47	7
NC4FM	35,450	311	45	5
W3GQ	30,381	198	46	11
SOUTH CAROLINA				
AA4V	**321,810**	**1008**	**59**	**43**
W4MEL	4,175	79	24	1
TENNESSEE				
N4DW	**111,048**	**478**	**57**	**27**
N4VV	75,614	338	55	22
VIRGINIA				
NR4M	**405,807**	**1160**	**59**	**50**
N4RV	188,575	654	59	36
W3YY	39,235	168	30	29
ARKANSAS				
K5GO	**376,747**	**1301**	**59**	**48**
NEW MEXICO				
NA5NM	**280,291**	**1124**	**59**	**24**
TEXAS				
N1LN	**277,206**	**1102**	**58**	**36**
K5NA	67,878	274	51	30
N3BB	53,340	251	45	25
CALIFORNIA				
N6DZ	**192,622**	**780**	**55**	**19**
K6KM	152,218	710	55	19
N6KI	52,490	392	51	7
W6ISO	42,480	281	50	9
W6YRA	5,713	82	27	2
UTAH				
N7JW	**424,255**	**1171**	**59**	**48**
NS7K	87,552	582	56	8

MICHIGAN				
W8RT	**362,944**	**1155**	**59**	**48**
K8XXX	292,980	1165	59	36
K8JD	3,456	51	32	0
OHIO				
AD8P	**163,800**	**713**	**58**	**26**
N8TR	109,470	358	57	32
N8KM	11,256	112	38	4
WC8VOA	6,231	93	31	0
WEST VIRGINIA				
K8OQL	**102,808**	**599**	**58**	**13**
ILLINOIS				
K9NR	**336,897**	**1313**	**59**	**40**
AI9L	37,700	215	50	15
N9TF	14,036	133	43	1
W9OL	13,653	147	41	0
W9LYN	2,323	35	20	3
INDIANA				
W9IU	**234,875**	**970**	**59**	**33**
WISCONSIN				
WBAIH	**234,689**	**1009**	**58**	**33**
COLORADO				
K0RF	**228,252**	**933**	**59**	**33**
K0DU	220,800	993	60	20
K0SX	120,888	754	56	13
IOWA				
N0NI	**317,618**	**1286**	**59**	**39**
N2AWE	45,372	349	55	2
MINNESOTA				
KT0R	**104,214**	**686**	**58**	**8**
W0MR	80,064	534	56	8
MISSOURI				
N5RR	**28,600**	**225**	**50**	**5**

CANADA

PRINCE EDWARD ISLAND				
VY2ZM	**1,591,128**	**1647**	**59**	**73**
QUEBEC				
VE2OJ	**353,446**	**906**	**59**	**20**
ONTARIO				
VE3EJ	**965,550**	**1391**	**59**	**64**
VE3EY	345,290	805	58	28
VE3YAA	332,880	839	57	23
ALBERTA				
VE6AO	**100,947**	**366**	**51**	**6**
VE6JY	50,220	195	50	4
VE6LB	48,438	218	41	5

AFRICA

MADERIA IS				
CT9M	**1,473,417**	**1203**	**53**	**70**
CT9C	**977,573**	**955**	**42**	**61**

ASIA

ASIATIC RUSSIA				
RY9C	**442,544**	**713**	**0**	**68**
RT9W	378,200	668	0	61
RK9CZO	303,849	525	0	63
RZ9WXK	140,910	360	0	42
RK0LWW	710	28	1	4
JAPAN				
JF2SKV	**15,886**	**84**	**9**	**17**
JE1ZWT	14,898	86	11	15
JS3CTQ	9,854	64	5	21
JA1ZLO	2,964	49	6	7
KAZAKHSTAN				
UP5G	**171,041**	**323**	**0**	**59**

EUROPE

ALAND ISLANDS				
OH0Z	**344,982**	**986**	**7**	**59**
AUSTRIA				
OE2VEL	**167,416**	**455**	**12**	**56**
BELGIUM				
OO4UN	**831,668**	**1073**	**46**	**78**
OR5N	95,639	305	11	48
BOSNIA				
T98U	**847,119**	**1397**	**28**	**79**
CROATIA				
9A0R	**726,440**	**1219**	**29**	**75**
9A1A	**722,357**	**1143**	**29**	**78**
9A7A	609,160	1100	28	69
9A2U	507,129	987	25	68
9A1P	439,546	943	22	64
9A3B	375,092	888	18	61
9A1ACD	105,192	385	2	52
9A4KL	102,366	428	1	46
9A5MT	75,690	321	0	45
CZECH REPUBLIC				
OL4HQ	**368,869**	**1012**	**14**	**59**
OL4A	**354,788**	**853**	**19**	**62**
OL3Z	340,571	890	16	61
OL2U	224,724	768	8	53
OK1KDO	223,077	757	7	54
OL1F	204,333	714	6	55
OL1C	158,345	607	7	48
OL9S	147,711	579	1	52
OL7Q	133,416	386	16	52
ENGLAND				
G6PZ	**644,787**	**1165**	**35**	**64**
G3WPH	256,080	574	24	56
G0MTN	65,912	221	14	42
FINLAND				
OH1MA	**149,264**	**342**	**11**	**65**
OH1MM	136,231	434	3	56
OH2K	107,916	407	1	50
FRANCE				
F5OIU	**717,007**	**1112**	**41**	**66**

GERMANY				
DLØAO	**478,895**	**977**	**25**	**70**
DKØEE	**377,740**	**942**	**18**	**67**
DK1II	370,329	827	22	67
DL9YX	364,560	776	24	69
DL8LAS	293,514	741	24	54
DL6RAI	292,146	664	20	67
DL1MGB	288,405	670	22	65
DF3CB	276,834	610	24	62
DKØIW	272,004	760	15	61
DH1NFL	155,025	502	13	52
DL4RDJ	152,697	455	12	57
DL3BUE	145,740	532	5	55
DKØPM	142,758	492	7	56
DK1NO	137,953	427	10	57
DL4MM	124,180	343	19	51
DL3DXX	112,808	392	5	54
DJ2MX	102,068	278	17	51
DL2MY	85,668	300	7	52
DJ9MH	84,300	294	9	51
DL5XL	83,858	424	0	46
DKØNS	82,482	288	8	51
DAØFF	80,598	293	8	49
DJ9NMH	77,836	286	8	50
DJ9RR	73,872	335	0	48
DK2GZ	60,579	231	6	47
DLØIT	59,780	264	7	42
DK3QJ	49,550	206	4	46
DHØGHU	44,180	201	0	47
DAØMD	28,644	159	1	41
DL6MHW	24,528	118	4	38
DL3ABL	19,368	114	1	35
DL8NFU	17,792	129	0	32
DH1NHB	13,920	101	0	32
DK7ZT	9,702	60	3	30
DLØWMS	6,912	51	1	26
DL8AAM	6,237	50	0	27
HUNGARY				
HA3O	**924,084**	**1370**	**32**	**82**
HG1S	641,900	1145	27	73
HA5A	599,169	1126	27	70
HA5PT	66,660	300	1	43
ISLE OF MAN				
MD4K	**1,232,078**	**1731**	**46**	**76**
ITALY				
I4EAT	**769,350**	**1148**	**39**	**76**
IQ2CJ	654,738	1134	31	71
KALININGRAD				
RK2FWA	**915,491**	**1459**	**33**	**76**
LITHUANIA				
LY7M	**460,056**	**974**	**15**	**72**
LY7A	344,925	900	8	65
LY2XW	224,406	677	6	57
LUXEMBOURG				
LX7I	**828,776**	**1437**	**35**	**69**
MACEDONIA				
Z37M	**541,832**	**1125**	**17**	**72**

NETHERLANDS				
PI4D	**500,864**	**1047**	**30**	**56**
PC5M	333,696	647	31	57
PA1T	238,345	604	17	56
PA5TT	70,172	251	0	53
PI4ALK	36,360	179	2	38
POLAND				
SN1D	**211,050**	**655**	**8**	**55**
SP9PZU	51,280	255	0	40
ROMANIA				
YO5KAD	**312,378**	**899**	**7**	**59**
RUSSIA				
RU1A	**689,325**	**1263**	**22**	**79**
RK4UWR	**430,023**	**887**	**4**	**79**
RA6YP	310,100	486	33	67
RA4LW	223,258	567	4	70
RK3DZD	138,024	510	0	54
RK3SWB	86,700	327	0	51
RK3AWK	36,404	203	0	38
RA3DNC	21,164	106	0	37
SERBIA				
YTØA	**705,748**	**1139**	**31**	**75**
YZ7A	663,705	1096	29	76
YU1ZZ	365,625	930	12	63
YU1AAV	132,192	482	2	52
SLOVAKIA				
OM7M	**985,572**	**1283**	**41**	**85**
OM8A	869,652	1274	33	83
OMØC	442,636	1023	14	68
OM5R	402,723	857	19	68
SLOVENIA				
S5ØC	**616,200**	**1087**	**33**	**67**
S52W	405,326	935	18	64
S57UN	383,690	837	19	66
SPAIN				
EA2CLU	**70,200**	**248**	**8**	**46**
SWEDEN				
SK7DX	**392,760**	**1028**	**12**	**60**
SM6CNN	211,002	610	12	54
SWITZERLAND				
HB9CRV	**445,244**	**1068**	**18**	**61**
UKRAINE				
UU7J	**780,804**	**1122**	**30**	**93**
UU5A	**231,495**	**649**	**10**	**59**
UT4IYZ	167,238	608	7	47
UV2L	103,868	450	0	46
UT7CWW	56,784	269	0	42
UT4UXW	1,236	26	0	12
UR4UYB	511	20	0	7
UT4UYA	504	15	0	8

OCEANIA

HAWAII				
KH7X	**575,568**	**806**	**56**	**16**
KH6GP	243,878	404	50	11
N. MARIANAS				
KHØA	**46,008**	**198**	**12**	**12**
NEW ZEALAND				
ZL6QH	**272,160**	**384**	**38**	**34**

CW CHECK LOGS

Thanks to the following stations for their valuable CW check logs.

DD1IM, DL1DVN, HAØGK, IV3RLB, N7OS, OE6IMD, OH3BU, OH5PT, OK2BDF, OK2BOB, OK2KMO, PAØB, PAØDVM, RA6LBS, RA3FD, RV3ID, SM4DHF, SP2GJV, SP2HPD, SP3CUG, SP5DDJ, SP7AWG, SP7HQ, SP7HT, SP8BRQ, SQ9UM, UA1AKE, UA4CC, UA9CL, UN7GM, UT3UA, UT7UW, VE6JO, VK6HD, YI9KT.

2005 SSB RESULTS

SINGLE OPERATOR

NORTH AMERICA

UNITED STATES

CONNECTICUT				
W1CTN*	**57,135**	**374**	**52**	**13**
KA1VMG*	17,934	188	40	2
W1AIR	12,256	172	29	3
K1BV*	4,324	82	21	2
N1WI*	3,120	57	25	1
N1ZN*	2,448	62	17	1
MASSACHUSETTS				
N1SV	**111,340**	**577**	**53**	**23**
K5ZD	83,622	376	53	24
K1TWF	48,180	327	45	15
K1EP*	**44,602**	**329**	**49**	**9**
W1FJ	22,410	201	36	9
W1TW/QRP	**19,270**	**180**	**42**	**5**
WB1AEL	13,432	117	37	9
AA1O	9,864	112	32	4
N1HTS*	7,595	103	28	3
N1QDX/QRP	6,804	107	26	1
NE1RD*	5,400	78	29	1
K1IR*	4,984	66	23	5
WB1DX*	1,105	28	16	1
MAINE				
N1LW*	**28,710**	**216**	**46**	**9**
K1JB	21,420	210	42	3
W1CEK/QRP	**14,364**	**165**	**35**	**3**
N1YIS*	4,144	61	27	1
NEW HAMPSHIRE				
AF1T	**130,575**	**713**	**57**	**18**
N1IK	115,778	669	57	16
K1HAP	93,708	488	56	20
W1MKY	9,338	140	28	1
RHODE ISLAND				
N1HRA	**96,871**	**558**	**57**	**16**
W1YRC	7,616	89	28	6
KO1H/QRP	**5,304**	**93**	**26**	**0**
W1HPH	2,688	55	19	2
VERMONT				
N1BCL	**8,448**	**117**	**32**	**0**
NEW JERSEY				
N1RK	**60,280**	**477**	**45**	**10**
K3BU/QRP	**56,896**	**381**	**55**	**9**
N2NT	46,079	325	48	11
AB2E	27,246	199	46	11
N2VW	21,996	196	38	9
W2MF/QRP	21,634	132	46	12
W5KI	13,776	135	35	7
W2TAG*	**10,200**	**106**	**35**	**5**
K2AF	9,540	86	41	4
WA2ALY*	7,099	104	29	2
K2YLH*	5,668	97	26	0
NEW YORK				
WA2JQK	**88,128**	**526**	**57**	**15**
WB2KLD	45,632	296	55	9
K2UF*	**33,534**	**262**	**46**	**8**
W2GDJ	31,240	247	50	5
N2EK*	29,946	277	38	8
N2MTG*	21,650	187	45	5
W2WB*	21,571	167	43	10
K2YR	20,496	163	38	10
N2BZP	13,062	122	33	9
K2YEH*	12,144	105	33	11
W2JUV*	8,649	120	31	0
WB2HJV*	4,470	64	29	1
DISTRICT OF COLUMBIA				
W3DQ	**72,480**	**534**	**54**	**6**
4U1WB	1,496	44	17	0
DELAWARE				
NY3C*	**5,022**	**84**	**27**	**0**
KB3KYZ*	3,013	55	21	2
AA1K/M*	288	16	9	0
W3MAX*	256	13	8	0
MARYLAND				
N3HBX	**162,675**	**929**	**57**	**18**
AI3Z	76,545	538	56	7
W3LL*	**64,695**	**518**	**52**	**5**
W6AAN	53,298	363	51	12
K3ZO	49,060	384	44	11
N3UM	39,366	313	44	10
K2PLF	31,388	220	49	10
W2GG*	11,193	102	32	9
K3DNE*	10,584	125	33	3
K4MUT*	7,128	87	33	3
WK3H*	3,520	82	20	0
K3TW/QRP	**2,220**	**48**	**19**	**1**
PENNSYLVANIA				
W3BGN	**205,560**	**888**	**58**	**32**
W3TS	**151,848**	**937**	**58**	**14**
W3GH	88,272	519	58	14
K3MD	83,952	547	53	13
K4JLD	79,500	422	54	21
W3PT	39,804	253	48	14
K3VED*	**21,805**	**193**	**43**	**6**
W3TDF	20,412	215	39	3
K3SWZ*	19,796	170	40	9
N3MX	18,920	178	36	7
KB3TS	16,765	213	31	4
N3GJ*	15,416	153	33	8
W3FVT	11,200	145	33	2
KA3FZN*	8,160	114	31	1
NN3W*	4,158	62	25	2
ALABAMA				
K4WI*	**49,206**	**367**	**48**	**11**
N4JDB	48,262	366	53	6
W4NTI	14,904	133	36	10
FLORIDA				
WX4G	**42,399**	**279**	**49**	**14**
K9HUY	32,718	247	45	12
K4ADR*	**24,367**	**161**	**44**	**15**
NJ2F	20,196	142	40	14
AA4RX*	11,835	114	38	7
WB3D	8,360	87	32	8
KO4BB*	4,402	65	27	4
N4CU*	1,827	33	16	5
KG4MWO*	1,235	28	16	3
K1TO*	24	4	3	0
GEORGIA				
N4PN	**390,264**	**1476**	**58**	**43**
WA4TII	131,054	780	58	16
N4NX	10,810	99	41	6
K4BAI	8,917	110	33	4
WB4SLM*	**5,530**	**67**	**31**	**4**
AA4LR*	845	28	13	0
K4AQ/QRP	320	16	10	0
KENTUCKY				
W4LJM	**98,696**	**591**	**57**	**16**
W4KP	28,985	228	50	5
KR4BD	27,140	195	51	8
N4EQT*	**22,204**	**191**	**49**	**3**
NORTH CAROLINA				
NX9T	**103,707**	**674**	**56**	**13**
KG4NEP*	**31,096**	**268**	**44**	**8**
W4TMR/QRP	**30,942**	**265**	**48**	**6**
N2BT	29,795	207	50	9
K4SV	14,190	130	33	10
N4HN	9,766	114	35	3
W4TME*	7,770	96	33	2
AE4EC*	1,767	42	17	2
N4TL	969	24	15	2

CLUB SCORES

(Minimum of 3 three entries required for listing)

CLUB	SCORE
BAVARIAN CONTEST CLUB	12.918,460
YANKEE CLIPPER CONTEST CLUB	10,685,744
POTOMAC VALLEY RADIO CLUB	7,735,945
FRANKFORD RADIO CLUB	7,729,068
CONTEST CLUB ONTARIO	7,433,182
RHEIN RHUR DX ASSOCIATION	6,030,888
KTU RC (LITHUANIA)	4,637,536
ATCC (REP OF GEORGIA)	4,637,536
SOC OF MIDWEST CONTESTERS	3,659,866
HA DX CLUB	2,714,768
TENNESSEE CONTEST GROUP	2,527,100
SLOVENIAN CONTEST CLUB	2,300,316
CONTEST CLUB FINLAND	2,129,459
CROATIAN CONTEST CLUB	1,855,975
RUSSIAN CONTEST CLUB	1,827,918
MAD RIVER RADIO CLUB	1,718,173
SP DX CLUB	1,541,126
NORTH TEXAS CONTEST CLUB	1,496,083
NO. CALIFORNIA CONTEST CLUB	1,489,347
UKRAINIAN CONTEST CLUB	1,469,485
CRIMEAN CONTEST CLUB	1,452,663
FLORIDA CONTEST GROUP	1,399,458
SOUTH EAST CONTEST CLUB	1,370,567
MINNESOTA WIRELESS ASSOCIATION	1,342,723
VRHNIKA CONTESTERS (S5)	1,200,426
UDXC (RUSSIA)	1,152,614
CHILTERN DX CLUB (ENGLAND)	1,131,321
WORLD WIDE YOUNG CONTESTERS	1,051,246
BELARUS CONTEST CLUB	928,191
OK DX FOUNDATION	893,063
LATVIAN CONTEST CLUB	752,900
KANSAS CITY DX CLUB	732,037
SOUTHERN CALIF CONTEST CLUB	670,695
READING AND DISTRICT ARC (UK)	635,547
CAROLINA DX ASSOCIATION	616,604
DARC (GERMANY)	581,504
GRAND MESA CONTESTERS	568,215
HUDSON VALLEY CONTESTERS/DX	546,704
BASHKORTOSTAN DX CLUB (Siberia)	537,683
BR. COLUMBIA DX CLUB	449,057
WESTERN WASHINGTON DX CLUB	404,914
NORTH COAST CONTESTERS	379,159
SW OHIO DX ASSOCIATION	362,923
MEDINA 2 METER GROUP	355,806
CENTRAL AZ DX ASSOCIATION	354,163
CACTUS RADIO CLUB	351,607
SPOKANE DX ASSOCIATION	328,074
FOX CONTEST CLUB (SERBIA)	307,641
WILLIAMETTE VALLEY DX CLUB	307,584
CENTRAL TEXAS DX CC	270,774
CT RI CONTEST CLUB	260,445
WESTERN NY DX ASSOCIATION	258,658
KIEV CONTEST GROUP	190,864
CENTRAL SIBERIA DX CLUB	180,755
SKY CONTEST CLUB (SERBIA)	170,691
SOUTHEASTERN DX CLUB	137,179
SUCC (SIBERIA)	109,894
NO ARIZONA DX ASSOCIATION	95,656
GREEN VALLEY ARS	80,387
ROCHESTER DX ASSOCIATION)	72,389
WEST PARK RADIO OPERATORS	69,310
KENTUCKY CONTEST GROUP	64,038
VERON	52,058
MOTHER LODE DX/CONTEST CLUB	42,463
URE (SPAIN)	37,895

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SOUTH CAROLINA

KR4M	**76,625**	**518**	**53**	**13**
WB4ENE*	**33,320**	**253**	**44**	**12**
KG4ORA*	12,780	113	37	8
N2FY	11,954	113	36	7
NJ4F	6,664	82	29	5
KR1ST/QRP	**2,440**	**55**	**18**	**2**

TENNESSEE

W4PV	**111,354**	**759**	**58**	**9**
K1GU	99,660	683	55	11
AD4EB	53,100	404	52	7
K4LTA	40,014	334	47	7
N4ZZ	38,880	370	44	4
WA4JA/QRP	**29,484**	**258**	**47**	**5**
W2OO	11,653	109	35	8
W4NZ	10,191	97	36	7
K4TRH*	**8,448**	**74**	**39**	**5**
W4OGG	5,248	66	29	2
WA4OSD*	1,786	44	19	0
WA4GLH	1,278	34	18	0

VIRGINIA

W4MYA	**235,554**	**1128**	**59**	**27**
WK4Y	**101,780**	**646**	**55**	**15**
N4DWK	60,298	448	50	9
N4MM*	**41,536**	**306**	**49**	**10**
N4BCC	36,414	317	47	4
KA8Q*	34,884	266	49	8
W4YE*	18,189	185	36	7
W2YE	12,956	126	33	8
K1KO	9,321	95	33	6
AD4TJ*	9,310	117	30	5
K4RDU	5,096	79	26	2
WF1L*	4,200	57	27	3
N4DEN	3,036	57	21	2
KG4URP*	736	23	16	0
N4JED*	30	5	3	0

LOUISIANA

N5ASA*	**12,144**	**123**	**39**	**5**

MISSISSIPPI

N5PA	**77,553**	**547**	**52**	**11**
NI5F	20,250	176	43	7
WD5BJT*	4,323	55	29	4

NEW MEXICO

N6ZZ	2,912	43	25	3

OKLAHOMA

K2BA*	**46,438**	**328**	**53**	**9**
N5OHL	5,952	87	30	2

TEXAS

K5RX	**99,258**	**610**	**57**	**14**
K5BG	24,745	227	45	4
K5NZ	8,172	99	33	3
KI5JF	6,237	87	31	2
K5SF*	352	16	11	0

CALIFORNIA

K6TQ	**71,488**	**487**	**55**	**9**
KB7Q*	**59,292**	**430**	**53**	**8**
NJ6P	40,600	299	49	9
N6RO	33,516	253	50	7
N6AA	33,428	228	51	10
KG6AO	19,550	169	45	5
W6HG	14,402	179	36	2
K6SE	14,306	129	40	6
W6RKC	11,004	109	36	6
KI6T	8,159	85	36	5
NT6K*	7,316	101	28	3
N6NF*	6,976	100	30	2
K6XV*	4,732	82	25	1
N6HC*	4,578	103	20	1
KE6QR*	3,842	104	16	1
W6SC	3,576	67	22	2
K6RAD	2,160	39	23	1
KA6BIM	1,909	33	19	4
AA6EE*	1,887	51	16	1
K6ASK	1,155	34	14	1
KU6T*	1,092	36	13	1
N6LL*	756	30	11	1
KG6NDO*	612	24	12	0
K6III	492	16	11	1
W6TRI*	369	19	8	1
NF6V*	174	13	5	1

ARIZONA

N7GP*	**70,560**	**506**	**53**	**10**
NF7E	49,440	371	52	8
KJ7WY*	22,385	171	47	8
W7UPF*	10,578	105	37	6
W7YS	8,056	97	37	1
K7SP*	3,328	46	30	2

IDAHO

KE7RT	**30,888**	**253**	**50**	**4**

MONTANA

W7IZL	**91,790**	**587**	**54**	**12**
K7BG	36,558	297	50	4
KI5TT	15,372	152	39	3
WA7MT*	**10,736**	**104**	**41**	**3**
KG7VQ/QRP	264	15	8	0

NEVADA

NZ7T	**39,424**	**296**	**46**	**10**
W7RN	25,200	233	41	7
AE7DX*	**13,440**	**149**	**37**	**3**
K7ICW*	9,717	98	37	4

OREGON

KI7Y	**25,387**	**200**	**45**	**8**
K7ZSD	21,021	179	43	6
W3CP*	**10,948**	**100**	**41**	**5**
W7OR*	9,512	104	39	2
N7VS*	630	32	8	1
KE7AUB*	90	9	5	0

UTAH

AF7Y	**50,982**	**395**	**52**	**6**
KF7IQ	1,881	42	18	1

WASHINGTON

WA7LT	**101,376**	**672**	**55**	**11**
W7DX	101,304	648	55	12
K7RL	77,504	515	55	9
AC7PN	55,693	399	53	8
K7OX*	**36,120**	**276**	**50**	**6**
NG7Z*	896	26	14	0
W7GTO/M*	64	8	4	0

WYOMING

NQ7Q	**15,640**	**149**	**43**	**3**
W7SE	11,271	131	36	3

MICHIGAN

K8OOK	**66,002**	**481**	**53**	**8**
N8LJ	65,018	497	54	5
N8OL	61,398	525	53	1
W8MJ	61,320	461	56	4
K8MJZ*	**39,525**	**343**	**47**	**4**
K8GVK*	15,210	148	41	4
K8GT*	10,138	122	36	1

OHIO

ND8DX	**197,659**	**1116**	**59**	**18**
N8FW*	**98,352**	**586**	**57**	**15**
K8FH*	56,040	414	53	7
K8NVR*	55,216	430	51	7
AD8P	52,156	398	53	6
KC8QAE*	27,450	241	44	6
WB8JUI*	25,959	229	46	5
K8BL*	23,664	166	50	8
NA8W*	23,267	187	47	6
WB8TCT*	17,204	159	42	4
N8PY	16,881	139	42	9
K8BB*	15,272	142	42	4
K8DV*	14,544	137	46	2
N8IE/QRP	**14,145**	**152**	**38**	**3**
KC8IVC	13,770	131	40	5
N8OH*	13,612	148	39	2
WA8MGD*	12,264	134	41	1
WD8EKH*	9,120	96	39	1
W8VE/QRP	7,980	115	28	2
K8VUS	6,150	95	30	0
N8XA/QRP	5,096	87	28	0
W8IDM*	4,455	78	27	0
N8KOJ	3,699	64	26	1
AB8HY*	3,100	56	25	0
W8KNO*	3,000	58	24	0
N8GU*	2,541	53	20	1
AF8C*	1,125	33	15	0
W1PDI	516	20	12	0

WEST VIRGINIA

W5GFR	**107,848**	**715**	**56**	**12**
N8II	90,720	637	52	11
K8OQL	68,808	498	52	9
N4SEA	40,548	277	52	10
WA3HOK/QRP	**30,250**	**271**	**48**	**2**
K2UOP	25,350	210	40	10

ILLINOIS

WB9Z	**262,602**	**1424**	**58**	**23**
AB9H	97,839	699	57	6
N2BJ	74,907	532	57	6
AI9L	68,380	454	56	9
K9FO	49,654	361	55	6
K9MMS*	**31,179**	**239**	**52**	**5**
K9QVB*	24,531	218	47	4
W9LYN*	22,981	209	45	4
AA9RT*	20,688	196	47	1
KG9N*	15,134	138	39	7
K9TR*	12,728	129	39	4
N9LYE*	10,373	113	39	2
KK9A	9,840	104	36	5
WO9S	9,730	124	35	0
WA9LKZ*	1,184	34	16	0

INDIANA

K9SG	**94,144**	**673**	**57**	**7**
KA9F	25,950	233	45	5
W9DZ*	**20,961**	**183**	**48**	**3**
KB9RDS*	10,360	133	33	2
W9RE	8,502	97	37	2
N9OI*	5,611	80	30	1
WB9NOO*	3,024	63	21	0
NE7I*	768	21	15	1
AJ9J/M*	8	2	2	0

WISCONSIN

K9UW	**102,366**	**703**	**58**	**8**
WA9TZE	63,216	356	58	14
KB9LIE	46,620	340	54	6
KB9Q	34,236	281	51	3
K9TY	16,677	141	49	2
KØCD/QRP	598	20	13	0

COLORADO

KØGAS	33,840	327	46	2
KØUK	33,210	269	47	7
WVØH*	**28,964**	**240**	**48**	**4**
WØETT*	19,760	166	47	5
KØRI	16,224	154	44	4
KBØYH/QRP	**3,973**	**67**	**29**	**8**
KØCOM	1,003	28	17	0

IOWA

WØBVR*	**5,168**	**65**	**38**	**8**

KANSAS

WØNO	**114,335**	**791**	**56**	**9**
KØRH*	**45,540**	**347**	**53**	**7**
KØBJ*	27,772	231	48	5
WØCEM*	3,190	49	26	3

MINNESOTA

NM7X	**114,368**	**798**	**58**	**6**
KTØR	96,579	670	57	6
WØZR	68,288	470	55	9
KØTT	62,622	427	55	8
ACØW*	**52,328**	**368**	**56**	**6**
K4IU	33,060	248	52	6
KØKX*	14,016	120	41	7
NØAT*	16	4	2	0

MISSOURI

KU1CW	**174,450**	**1021**	**58**	**17**
AE9B	74,052	493	55	11
KØJPL	45,322	327	55	7
ABØO*	3,052	55	27	1
KIØHA	2,673	45	26	1

NORTH DAKOTA

KD4POJ*	**21,677**	**188**	**49**	**4**
KØUD*	144	9	8	0

NEBRASKA

WNØL*	**4,588**	**52**	**34**	**3**
KBØARZ*	4,521	67	33	0
WØHXL	4,116	46	40	2
AAØAZ	2,976	59	24	0

SOUTH DAKOTA

KDØS	**41,180**	**319**	**54**	**4**
KØHW*	**31,148**	**271**	**50**	**2**

CANADA
NEWFOUNDLAND

VO1HP	**648**	**9**	**1**	**8**

PRINCE EDWARD IS

VY2ZM	**952,560**	**1255**	**59**	**61**

NEW BRUNSWICK

VE9KAR*	**76,842**	**296**	**42**	**12**

ONTARIO

VE3PN	**259,584**	**673**	**57**	**21**
VA3KA	**244,742**	**629**	**58**	**21**
VE3XN	195,640	608	56	11
VE3MGY/QRP	**87,395**	**330**	**48**	**7**
VE3KYG*	**58,032**	**234**	**48**	**4**
VE3KP*	57,132	219	47	7
VE3NZ*	43,302	214	38	4
VE3KZ/QRP	40,592	199	41	2
VE3VMP*	34,040	154	40	6
VE3RCN*	23,199	149	33	0
VE3WG*	21,504	147	31	1
VE3JAQ*	16,269	104	31	2
VA3NR*	15,903	108	31	0
VE3CR*	9,490	79	26	0
VE3XAT*	7,924	59	27	1
VE3OBU	6,555	60	23	0
VE3DZ*	6,266	53	24	2
VE3NQM*	2,907	33	19	0
VA3SWG*	2,070	30	15	0
VE3EJ*	1,410	19	12	3
VA3JFF/QRP	2	1	1	0

SASKATCHEWAN

VE5UF*	**54,288**	**217**	**46**	**6**
VE5SF*	7,450	65	25	0

ALBERTA

VE6EX*	**38,587**	**172**	**44**	**3**

BRITISH COLUMBIA

VE7NS*	**33,323**	**149**	**43**	**4**

BAHAMAS

C6AMM*	4,080	21	17	7

COSTA RICA

TI2KAC/QRP	**2,840**	**25**	**10**	**10**

DOMENICAN REP

HI3NR*	1,105	15	7	6

MEXICO

XE2TG*	**8,397**	**64**	**24**	**3**
XE1V	984	16	7	5

PUERTO RICO

KP4KE/QRP	**109,800**	**276**	**50**	**25**

ST. KITTS

V44/W1USN*	60	4	0	3

US VIRGIN ISLANDS

KV4FZ	**398,886**	**618**	**56**	**58**
KP2BH*	3,180	27	9	11

AFRICA

CANARY ISLANDS

EA8CAC	**83,694**	**150**	**12**	**46**

CAPE VERDE IS

D4B	**1,461,379**	**1076**	**56**	**81**

CEUTA & MELILLA

EA9IE	**103,721**	**200**	**7**	**46**

MADERIA ISLAND

CT9L	2,015	17	1	12

MOROCCO

CN2R	**745,080**	**719**	**33**	**72**

NAMIBIA

V5/SP7VC	136	6	0	4

ASIA

ASIATIC RUSSIA

UA9AL*	**50,330**	**163**	**0**	**35**
UA9ACJ*	39,649	139	0	31
RX9AM*	30,510	113	0	30
RV9SV	11,646	71	0	18
UA9JDP	5,985	37	0	19

GEORGIA

4L2M*	**140,950**	**296**	**1**	**49**

IRAQ

T6KBLRM*	120	4	0	4

KYRGYZSTAN

EX8AA*	**17,750**	**79**	**0**	**25**

SINGAPORE

9V1GO	**1,837**	**19**	**1**	**10**

TURKEY

TA2RC*	**69,227**	**193**	**0**	**37**
TA7T*	18,981	108	0	19
TA9J*	6,270	46	0	15

EUROPE

AUSTRIA

OE9XRV	**106,608**	**440**	**1**	**47**

AZORES

CU2AF	**54,926**	**128**	**23**	**35**

BALEARIC ISLANDS

EA6LP	**14,400**	**85**	**1**	**31**

BELARUS

EU3AR	**74,046**	**333**	**0**	**43**
EU1AZ*	**24,552**	**148**	**0**	**31**

BULGARIA

LZ2DF*	**13,468**	**97**	**0**	**28**
LZ2UZ*	6,888	56	0	24

CROATIA

9A3RE*	**68,327**	**317**	**1**	**42**
9A1CMS*	902	17	0	11

CZECH REPUBLIC

OK1TP	**121,212**	**463**	**1**	**51**
OK1PI*	**61,191**	**324**	**0**	**39**
OK1FC*	58,136	278	1	42
OK1FDY*	34,656	180	1	37
OK1DOL*	29,205	185	1	32
OK2AB*	27,872	182	0	32
OK2BEN*	23,397	151	0	33
OL9S	14,716	123	0	26
OK1FJD*	11,448	87	0	27
OK1DVK	6,262	39	1	30
OK1FCJ	4,320	44	0	20
OK1JOC/QRP	**2,280**	**34**	**0**	**15**

DENMARK

OZ1DD	**408,852**	**936**	**11**	**71**
OZ8A*	**9,599**	**66**	**1**	**28**

ENGLAND

G3VAO*	**69,513**	**302**	**7**	**40**
M3RCV*	5,220	56	1	19
G4BJM	2,538	29	0	18
GØMTN*	222	8	0	6

ESTONIA

ES5TJO*	**34,510**	**189**	**0**	**35**
ES6PZ*	24,640	139	1	34
ES5RIM*	2,625	35	0	15

FINLAND

OH5NE	**65,231**	**295**	**0**	**43**
OH2BO	25,338	113	4	37
OH3JR	19,320	107	1	34
OH6NIO*	**18,326**	**106**	**0**	**34**

FRANCE

F6IRA	**76,550**	**301**	**4**	**46**
F5BBD	52,202	234	4	39
F5IN*	**14,112**	**87**	**0**	**32**
F8DNX*	364	9	0	7

GERMANY

DJ4PT	**292,464**	**906**	**11**	**61**
DK6WL	**171,927**	**616**	**8**	**55**
DJ7EO	106,904	453	6	50
DFØCG	97,461	454	6	45
DJ8UV*	**87,660**	**511**	**1**	**44**
DL2DBH	87,480	380	5	49
DL2NBU	71,550	277	6	48
DK2OY	62,280	334	3	42
DL9NDS*	49,774	300	1	40
DL2RMC*	41,328	240	2	40
DL5KUT	40,033	210	3	40
DL6EZ	37,205	269	1	34
DJ1AA*	36,468	255	1	35
DG2NMF	32,523	204	1	36
DL4WA*	25,376	201	1	31
DL2LTM*	24,354	175	0	33
DM2BPG*	23,488	176	1	31
DM5TI*	21,284	148	1	33
DG8NEL	19,668	131	1	32
DKØOG*	19,200	141	1	31
DKØNB*	18,080	131	1	31
DL2OBO*	17,056	127	1	31
DF1IAQ*	16,640	113	0	32
DF7RG*	15,980	103	1	33
DL2ZA*	14,368	106	1	31
DJ6TK*	14,176	99	2	30
DLØPAF*	14,040	127	0	27
DN2RMC*	14,010	107	1	29
DL1NEO*	13,878	129	0	27
DL4NN*	13,156	124	0	26
DL3MBG*	12,780	94	1	29
DL5MX*	12,712	107	0	28
DL4RCK*	12,625	125	0	25
DM3KTO*	12,272	100	0	28
DK1FW*	10,800	76	0	30
DL1TPY*	10,275	96	0	25
DL1MAJ*	10,220	81	0	28
DLØDX	9,384	88	0	24
DL3DRN*	9,296	75	0	28
DL5RBR*	8,592	85	0	24
DL3APM*	7,820	79	1	22
DF6WE*	7,680	79	0	24
DL9NCR*	7,015	68	1	22
DK7FP*	6,960	70	0	24
DGØLFG	6,575	56	0	25
DL5LYM	6,417	63	0	23
DJ5IW*	6,125	58	0	25
DL3BRA*	5,460	58	0	21
DLØFR*	5,359	55	0	23
DC2ZL*	4,788	54	0	21
DL1BUT*	4,660	55	0	20
DL1MGB	4,104	51	0	19
DL6NAL	2,839	42	0	17
DK4LI*	2,822	41	0	17
DK7MCX*	2,805	44	0	15
DKØDO	2,688	39	0	16
DK3YD*	2,669	35	0	17
DF2FM*	1,560	27	0	13
DL6RBH*	1,356	28	0	12
DL7UMK/QRP	**1,032**	**19**	**0**	**12**
DF2LH*	648	15	0	9
DB7MA*	36	3	0	3
DL3ZAI*	2	1	0	1

GREECE

SV1GRD	**18,496**	**111**	**0**	**32**
SV1BFW	13,195	69	1	34
SV1FXN	6,885	47	0	27
SV1DPI	2,112	26	0	16

HUNGARY

HG3M	**411,440**	**975**	**10**	**70**
HG8R	287,892	839	4	62
HA1DAE*	**46,800**	**232**	**1**	**39**
HA1CW*	34,164	191	1	35
HA1ZN/QRP	**21,672**	**158**	**1**	**27**
HA5PT*	10,556	78	0	28

IRELAND

EI4CF*	4,850	30	7	18

ITALY

IZ8DFO	**116,050**	**422**	**1**	**54**
IK3SWB*	**38,141**	**174**	**1**	**42**
IQ2LS*	32,414	171	1	37
IK4SPB	17,376	110	1	31
IK2AQZ*	16,227	122	0	27
IK1SPR*	1,111	22	0	11
IV3GCD*	720	18	0	8
IKØXBX/QRP	576	14	0	9
I7/9A3A	315	8	0	7

LATVIA

YL1ZJ	**48,760**	**234**	**0**	**40**
YL2PP/QRP	392	11	0	8

LITHUANIA

LY4A	**818,100**	**1461**	**12**	**88**
LY2OU	76,815	330	1	44
LY3BA*	4,811	59	0	17

LUXEMBOURG

LX7I	**178,680**	**577**	**7**	**53**

NETHERLANDS

PAØIJM	**60,200**	**273**	**1**	**42**
PC2T	54,530	265	1	40
PE2T	24,676	161	1	30
PAØLOU	16,665	98	1	32
PAØMIR*	**9,996**	**74**	**0**	**28**
PAØJNH	2,074	25	0	17
PG7V*	1,392	25	0	12

NORWAY

LA6WEA	**67,344**	**279**	**0**	**46**

POLAND

SN6C	**214,326**	**668**	**5**	**58**
SP6A	97,920	376	3	48
SP9BQJ	68,928	289	1	47
SP6IHE*	**54,696**	**254**	**1**	**42**
SP3GXH*	49,324	267	1	37
SP75MVG*	45,296	244	1	37
SP1FPG*	27,840	183	1	31
SP5TAT/QRP	**11,800**	**101**	**0**	**25**
SP1O*	11,480	65	1	34
SP1DMD*	11,414	93	0	26
SP2HXY*	11,112	98	0	24
SP1MWF*	9,192	79	0	24
SQ2EAN*	9,177	84	0	23
SP1RW*	8,883	67	1	26
SQ8T*	8,550	74	0	25
SP1MWF*	8,349	75	0	23
SP4LVK*	6,446	61	0	22
SP9LWH*	5,650	46	1	24
SQ75FMU*	2,756	43	0	13
SP5BYC/QRP	175	7	0	5

PORTUGAL

CT1FJK	**60,996**	**141**	**16**	**53**

ROMANIA

YO5OHZ	**48,729**	**263**	**0**	**37**
YO3CZW*	**9,637**	**85**	**0**	**23**
YO3CZW*	9,177	81	0	23
YO4BGK*	3,636	38	1	17

RUSSIA

UA3AKO	**160,776**	**600**	**2**	**56**
RK4FD	98,634	400	1	50
RX4HZ	72,520	246	2	54
RV1CC	72,333	318	2	45
UA6AIW*	**58,938**	**249**	**1**	**46**
RN4AA*	38,294	186	0	41
RA6AFB	30,880	158	0	40
RW4PL	30,299	147	1	40
UA4FRL*	25,344	145	0	36
UA3BL/QRP	**25,200**	**193**	**0**	**30**
RA3MB*	18,530	113	0	34
RN3OG*	18,447	115	0	33
RX3QDF*	18,420	130	0	30
UA3MOM*	13,110	92	0	30
UA3AGW	10,710	56	0	34
RK6AIQ*	8,257	82	0	23
RW6HJV/QRP	6,447	68	0	21
RW3AI/QRP	5,817	66	0	21
RA6XB*	4,944	37	0	24
RA4LW	4,899	41	1	22
UA3AAP/QRP	3,451	50	0	17
RA1QDP*	3,405	57	0	15
RZ3VA*	1,488	35	0	12
UA3LHL*	1,452	29	0	12
UA1ORT	1,236	22	0	12
RA3LAL*	125	5	0	5

SERBIA

YZ7UN*	**10,894**	**84**	**0**	**26**
YU2A*	6,048	50	0	24

SICILY

IT9RDG*	**24,185**	**132**	**1**	**34**
IT9VCE*	18,038	118	0	29

SLOVAKIA

OM2VL	**188,820**	**614**	**3**	**57**
OM4DN*	**29,342**	**174**	**0**	**34**
OM4EX*	21,216	132	0	32
OM3YK*	15,870	107	0	30
OM6AL*	9,888	81	1	23
OM7VF*	5,526	61	0	18
OM7TJ*	3,456	45	0	16

SLOVENIA

S57DX	**245,334**	**775**	**2**	**60**
S57M*	**236,928**	**716**	**4**	**60**
S57MSU/QRP	**48,984**	**255**	**1**	**38**
S53XX	17,220	125	0	28
S56ZZZ*	3,680	38	0	20

SPAIN

EA3GHQ	**63,553**	**260**	**1**	**48**
EA5EG	32,293	152	1	42
EA5GKC	22,143	136	0	33
EA1DVY*	**21,470**	**110**	**4**	**34**
EA3CCN	9,686	67	0	29
EA3AKA*	9,000	74	0	25
EA3FF/QRP	**6,486**	**57**	**0**	**23**
EA7HY*	3,520	30	1	21
EA4NP*	1,188	21	0	12

UKRAINE

UW2M	**179,985**	**571**	**1**	**64**
UT7DK	**110,950**	**453**	**1**	**49**
UW5U	86,750	347	2	48
UR5MNZ*	**54,495**	**242**	**1**	**44**
UT5DL	49,940	230	2	42
UT1FA*	49,456	234	0	44
UR5ZLK	46,870	222	1	42
UT5UML	44,608	382	0	32
UT6IS	35,092	239	0	31
UY5ZZ	13,473	108	0	27
US5ISV*	12,336	109	0	24
UT2UB	11,016	90	0	27
US0LW*	10,208	57	0	32
UR5MID	7,774	66	1	22
UU5A	7,744	71	0	22
US6IRF/QRP	**6,951**	**80**	**0**	**21**
US6IQE*	6,860	71	0	20
UR8IF*	6,534	64	0	22
UU2JQ	5,092	54	0	19
UR7EM	4,997	58	0	19
UT5UGR	1,716	30	0	13
UT2UZ/QRP	720	18	0	10

WALES

MWØXMG	**12,586**	**86**	**0**	**29**

SOUTH AMERICA

ARGENTINA

LU7HCS*	45	3	0	3

ARUBA

P4ØW	**643,356**	**603**	**56**	**52**

ECUADOR

HC1HC	**1,690**	**14**	**3**	**10**

URUGUAY

CX7ACH*	200	7	0	5

VENEZUELA

YV2IF	**83,475**	**140**	**34**	**29**
YV5MBX	27,470	74	22	19
4M5F	6,048	33	8	16

SSB MULTI-OPERATOR

NORTH AMERICA

UNITED STATES

MASSACHUSETTS

W1QA	**144,628**	**801**	**58**	**18**
WO1N	8,587	118	28	3

NEW HAMPSHIRE

WA1Z	**163,590**	**805**	**58**	**24**
KØTV	19,380	133	38	13
WA1ZYX	4,344	77	24	0

NEW JERSEY

N2CW	**302,202**	**1119**	**58**	**45**
K2OWE	109,340	659	57	14
AB2DE	96,287	557	56	17
N2WM	85,008	446	58	19
K2FL	7,874	114	28	3

NEW YORK

AA2GF	**60,770**	**451**	**51**	**8**
W2GB	28,224	203	44	12
K2NNY	18,032	163	46	3
K2NV	14,602	113	38	11

MARYLAND

K3DI	**96,040**	**597**	**56**	**14**
W9GE	38,584	325	43	9
W3UL	5,068	83	27	1

PENNSYLVANIA

WE3C	**193,424**	**867**	**58**	**30**
NN3Q	**141,988**	**778**	**58**	**19**
K3WW	117,875	693	56	17
W3SO	79,296	546	53	11
NE3F	73,920	440	54	16
W3FV	60,160	404	52	12
K3OO	25,088	200	36	13
K3ATO	17,200	180	33	7
N3ZA	12,105	105	35	10

FLORIDA

AA4MM	**164,430**	**711**	**58**	**32**
K4MM	22,401	143	43	14

GEORGIA

N4GG	**12,306**	**123**	**34**	**8**
N4XMX	9,786	99	35	7

KENTUCKY

K4UZ	**64,487**	**503**	**54**	**5**

NORTH CAROLINA

N4XD	**119,892**	**656**	**57**	**19**
K3KO	43,462	295	52	10
K4YFR	27,030	213	41	12

SOUTH CAROLINA

AA4V	**70,135**	**468**	**55**	**10**
W4UNP	41,405	265	52	13
NU4SC	18,480	159	37	11

TENNESSEE

K4JNY	**62,118**	**416**	**49**	**14**
N4VV	52,948	366	48	13
AG4V	14,036	92	50	8

VIRGINIA

W4IM	**123,662**	**721**	**57**	**16**
N4DSL	104,195	723	56	9
N4RV	76,590	415	56	18

ARKANSAS

WD5R	**143,420**	**910**	**58**	**13**

MISSISSIPPI

W5CR	**30,914**	**233**	**51**	**7**

NEW MEXICO

NA5NM	**66,060**	**489**	**52**	**8**

TEXAS

K5NA	**33,536**	**216**	**51**	**13**

CALIFORNIA

W6YRA	**13,032**	**169**	**34**	**2**
AE6NY	1,287	45	12	1

ARIZONA

NJ7I	**87,620**	**596**	**54**	**11**
KC7V	10,560	99	38	6

IDAHO

KG7H	**107,916**	**687**	**56**	**13**

MONTANA

K7TNJ	**107,840**	**755**	**55**	**9**

OREGON

W7DTV	**4,004**	**79**	**21**	**1**

OHIO

N8TR	**65,392**	**411**	**55**	**12**
N8KM	3,172	52	23	3

ILLINOIS

KM9M	**799**	**22**	**16**	**1**

INDIANA

W9IU	**120,267**	**770**	**56**	**13**
N9LF	16,200	159	41	4

MINNESOTA

WØMR	**48,510**	**316**	**55**	**11**

NEBRASKA

NØGVK	**54,544**	**438**	**53**	**3**

CANADA

QUEBEC

VE2UMS	**74,316**	**356**	**39**	**5**

ONTARIO

VE3YAA	**347,918**	**987**	**58**	**15**
VE6JY	**131,136**	**432**	**54**	**10**
VE6AO	31,949	157	40	3

BAHAMAS

C6ANM	**232,000**	**562**	**56**	**24**

HAITI

HH4/K4QD	**52,750**	**202**	**36**	**14**

MEXICO

XE1RCS	**466,242**	**854**	**58**	**44**
6I2CQ	91,685	335	47	8

TURKS & CAICOS

VP5B	**762,072**	**1241**	**59**	**54**

BELIZE

V31MD	**192,410**	**529**	**52**	**19**

ASIA

ASIATIC RUSSIA

RZ9WXK	**15,040**	**85**	**0**	**20**

EUROPE

AUSTRIA

OE2S	**100,350**	**397**	**1**	**49**

BELGIUM

OR5N	**107,730**	**475**	**5**	**40**

CZECH REPUBLIC

OL1A	**280,192**	**864**	**4**	**60**
OK1KMG	35,938	222	0	34

DENMARK

OZ1ADL	**112,860**	**394**	**5**	**50**

ENGLAND

G3UEG	**146,752**	**438**	**12**	**52**
M4A	58,840	329	1	39

FINLAND

OH1MM	**11,872**	**72**	**1**	**31**

FRANCE

TM7Z	**180,608**	**537**	**15**	**49**

GERMANY

DJ5MW	**80,529**	**362**	**3**	**48**
DFØCB	60,280	338	4	40
DL6RAI	51,940	236	2	47
DL3DXX	44,184	249	1	41
DG7RO	38,688	229	2	37
DKØMN	35,957	195	1	40
DDØYFD	33,630	198	1	37
DJ3WE	31,836	161	2	40
DJ2MX	31,654	200	1	37
DJ7MGQ	30,132	197	1	35
DJ9MH	28,945	212	1	34
DAØFF	26,085	175	1	36
DKØNS	24,048	171	1	35
DL4GBA	20,910	165	0	30
DF3CB	20,330	120	1	37
DL2MY	18,598	132	1	33
DFØWA	16,480	117	1	31
DL8NFU	10,476	97	0	27
DHØGHU	7,900	74	1	24
DH1NHB	5,496	55	0	24
DG4RBT	5,240	57	0	20
DLØEK	1,482	25	1	12

HUNGARY

HA8KCK	**368,060**	**901**	**9**	**68**
HA8ØIARU	275,795	826	5	60

IRELAND

EI7M	**363,933**	**778**	**25**	**56**
EI9JF	238,488	570	18	58

LATVIA

YL1S	**110,784**	**443**	**1**	**47**

LITHUANIA

LY7A	**176,955**	**721**	**0**	**47**
LY3UM	43,160	201	0	40

NETHERLANDS

PI4ZI	**86,204**	**374**	**1**	**45**
PA1TX	6,812	50	1	25

POLAND

SP9KTL	**91,560**	**436**	**0**	**42**
SP1YSZ	12,896	85	1	30

ROMANIA

YO5KAD	**168,663**	**571**	**0**	**57**

RUSSIA

RK3UWT	**22,440**	**145**	**0**	**33**
RU6YY	19,312	114	0	34

SERBIA

YZ7W	**303,310**	**823**	**5**	**65**

SLOVENIA

S53S	**161,011**	**537**	**2**	**57**

SPAIN

EA5AT	**69,629**	**282**	**2**	**47**
EA4KD	19,695	98	3	36

SWITZERLAND

HB9CXZ	**182,270**	**655**	**5**	**50**
HB9LC	26,928	163	1	32

UKRAINE

UU7J	**590,457**	**1467**	**10**	**83**
UT4IYZ	92,167	426	1	46

SSB CHECK LOGS

Thanks to the following stations for their valuable SSB check logs.

DL1DTC, EY8MM, K4JRB, K8GG, LU6FL, MØWTD, N3UA, N8BJQ, NE9A, OH3XA, RW1QD, SM5ARL, UA9CL, W4BCV.

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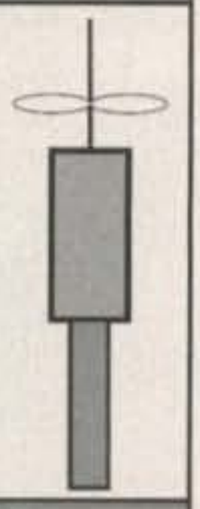

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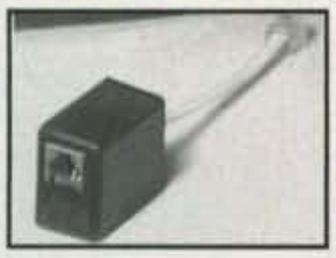

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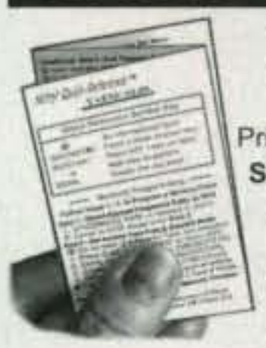

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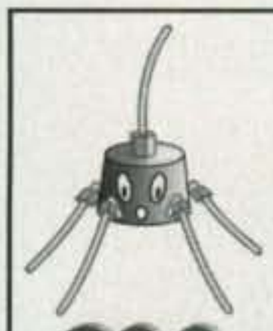

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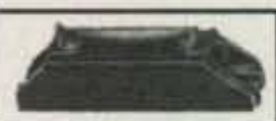
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Here's a look at articles we're working on for upcoming issues of *CQ*:

- 2005 SSB Results, CQ World-Wide WPX Contest
- "50 Years of DXing," by Ed Richmond, W4YO
- "100 Years of Phone," by Bob Shrader, W6BNB

Do you have a ham radio story to tell? See our writers' guidelines on the CQ website at:

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Oops...

Clarification: In our October news report on the annual meeting of the National Conference of Volunteer Examiner Coordinators, we reported that the group had decided not to file comments on the FCC's Notice of Proposed Rule Making on eliminating Morse Code from amateur license exams. Actually, the Conference made no decision at that time (July) on whether to file comments and has now formed a group to do so. In addition, there was apparently no connection between the FCC's NPRM and the conference's decision to disband its Rules Committee, which had previously written its FCC filings. Finally, ARRL-VEC Assistant Manager Perry Green, WY1O, did comment on disappointment among attendees that the FCC had not proposed a new entry level license, but made no comment regarding the FCC's decision not to include in the NPRM the NCVEC's proposal to automatically upgrade Technicians to General and Advanced Class hams to Extra. We regret the misunderstanding.

Also in the October issue, we accidentally swapped two photos on page 78. The photo at the top left belongs with the caption at the lower right and vice versa.

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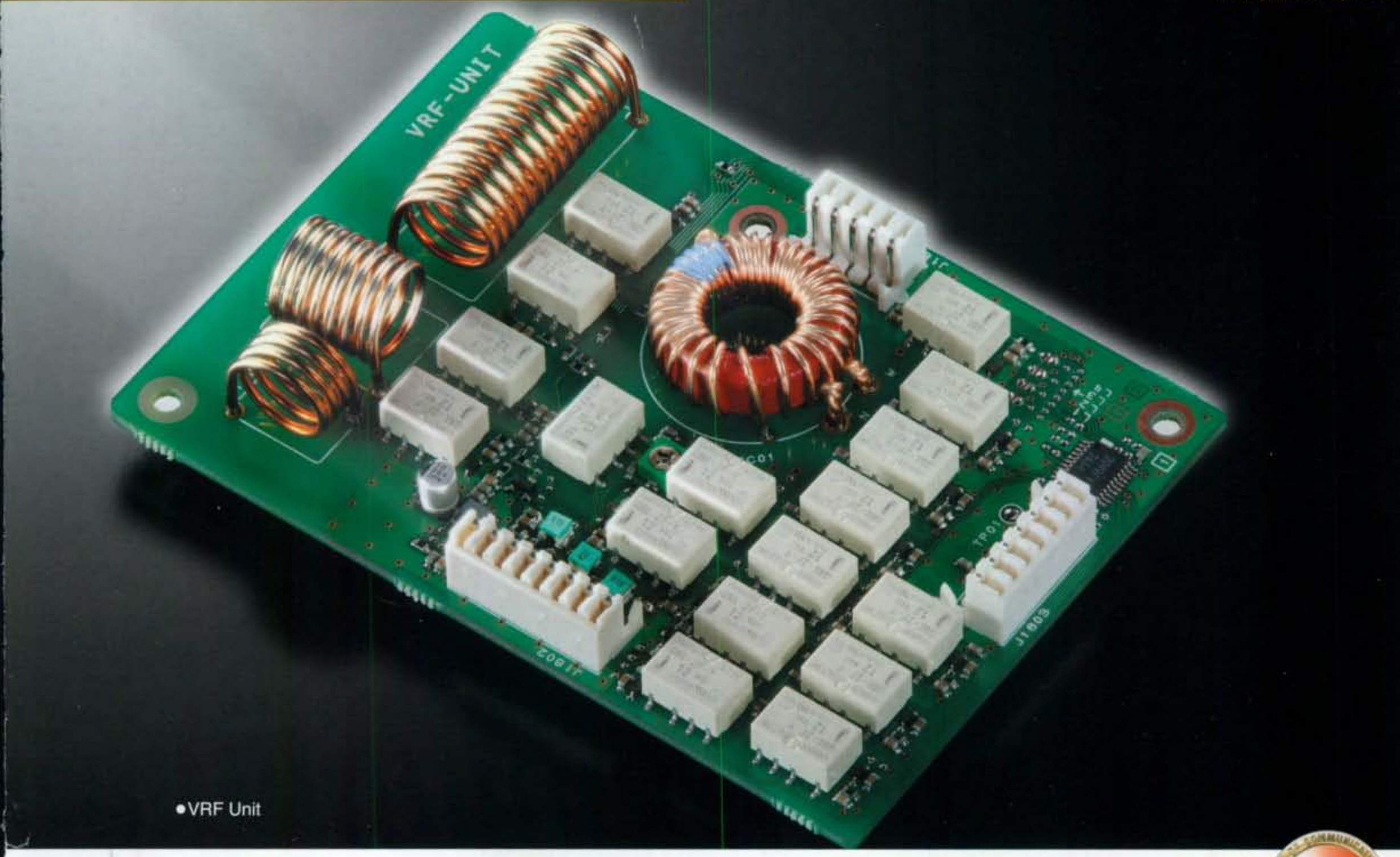
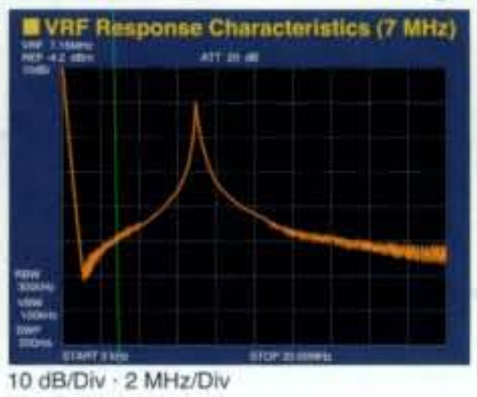


●VRF Unit

Crafting the FT DX 9000's Robust Receiver: Our 1.8 ~ 54 MHz VRF Preselector, and 1st IF 3 kHz Roofing Filter

The RF front end input circuit, consisting of the VRF (Variable RF Filter) and BPF (Bandpass filter) stages, is designed to protect the stages to follow (especially the RF amplifier and first mixer) from the effects of strong off-frequency signals. The VRF operates as an RF "preselector" with sufficient "Q" to be significantly narrower than the traditional BPF networks used for decades in solid-state receivers; as a result, much more interference suppression is afforded by the VRF circuit. The high Q is obtained, depending on the frequency of interest, by using large-diameter (T-80) toroidal inductors and air-core coils; a total of 31 relay-selected combinations of coils and capacitors are used to establish resonance around the operating frequency, and the VRF may also be optimally skewed to one side or the other of your operating frequency, in difficult cases of co-location interference inside the bandpass filter, by manually turning the VRF dial on the front panel. Following the VRF preselector stage, which operates an all Amateur bands from 160 through 6 meters, a fifteen-bank Bandpass Filter stage (8 networks for Amateur bands, 7 for general HF coverage) further extends the out-of-band protection, sending a thoroughly-filtered signal to the RF preamplifier. To switch these bandpass filters, 17 expensive surface-mount type relays are employed, guaranteed against surge voltage of 2500 V, providing immunity to contact degradation due to air pollution or humidity.



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FT DX 9000D 200 W Version

Large TFT, Data Management Unit and Flash Memory Slot Built In,
Main/Sub Receiver VRF, plus Full Dual Receive Capability,
Three μ-Tuning Modules for 160 - 20 M,
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